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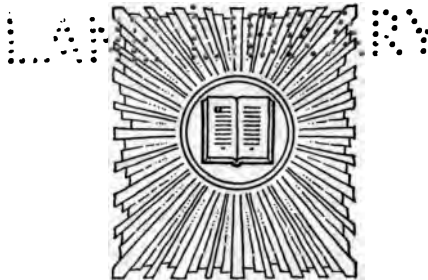
OTIS GROUP INTELLIGENCE SCALE



MANUAL OF DIRECTIONS

for
Primary and Advanced
Examinations

Edition 1920



WORLD BOOK COMPANY
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THE HOUSE OF APPLIED KNOWLEDGE

Established, 1905, by Caspar W. Hodgson

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During the past decade the individual method of intelligence measurement has rapidly developed, and its success has created the demand for a group method. In response to this demand the Otis Group Intelligence Scale has been evolved. Subsequently the successful use of a similarly constructed group intelligence scale with a vast number of draftees in the American army has given the method a scientific status and established its usefulness beyond question. World Book Company takes pleasure, therefore, in offering the Otis Group Intelligence Scale for use in schools, clinics, commercial houses, and other institutions in which it is desired to measure the native mental ability of individuals

WORLD BOOK COMPANY

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INTRODUCTION

The Otis Group Intelligence Scale is an instrument for the measurement of native mental ability. It is applicable to any individual, whether child or adult, who has had the equivalent of three or four years of schooling.¹ With subjects of this much schooling the Otis Scale probably comes as near testing raw "brain" power as any system of tests yet devised. Indeed, it was the first scientifically grounded and satisfactory scale for testing subjects in groups.

It is unnecessary to dwell on the practical importance of the group method of intelligence testing. It has once for all taken such tests out of the class of luxuries and made them a commonplace necessity in schools, industries, armies, or any other institution or situation in which the mental ability of human beings is a factor for consideration. The Otis Scale can be applied by one examiner to hundreds of individuals in a single day.

No one else has done as much as Dr. Otis to free intelligence tests from the influence of the personal equation of the examiner. Perhaps it is too much to hope that any mental tests can be made "fool proof," but it is not too much to say that the Otis Scale can be correctly given and correctly scored by any one who is intelligent enough to teach school. The plan of arranging the tests so that they may be scored by the use of stencils is a contribution of both practical and scientific importance.

Perhaps no one would claim — certainly not the author of this scale — that the method of group testing should take the place of the Binet and other methods of individual examination. The two methods supplement each other. The group method is the only method that can be used for wholesale work. When closer knowledge of a subject is desired, the individual examination is indispensable. Extension of the use of either method is certain to emphasize the supplementary value of the other.

In public schools, where wide use of the Otis Scale is predicted, it will doubtless be found advisable to test all pupils above the

¹ Dr. Otis has devised his Primary Examination since this was written.

third or fourth grade by the group method, to classify them for instruction provisionally on this basis, and later to apply an individual test to all exceptional or puzzling cases. This was the procedure followed in the United States Army.

Thanks to the use of such tests in the United States Army, their experimental period is a thing of the past. It would be surprising to find teachers and school principals lacking that open-mindedness toward psychological methods which was so conspicuously present in army officers, and we may confidently look forward to seeing millions of school children classified annually on the basis of intelligence tests.

LEWIS M. TERMAN

PREFACE

THE PURPOSES OF INTELLIGENCE TESTING

In order to attain a comprehensive insight into the purposes and uses of intelligence tests, one cannot do better than read the first chapter or two of Dr. Terman's valuable book, *The Measurement of Intelligence* (Houghton Mifflin Company, 1916). In the space permitted this preface it will be possible to do little more than enumerate these purposes.

Differentiation of bright, medium, and dull pupils. Any one who visits a typical public school in which the pupils of each grade number thirty or more can scarcely avoid noting marked differences between pupils in a single grade in the facility with which they assimilate knowledge of the subjects being taught. During almost any recitation, on nearly any topic, one may note three types of pupils. First, there are those to whom the conduct of the recitation seems fairly well adapted. They give good attention and learn moderately well. Second, there are the pupils who do not seem to be able to keep up with the discussion; when questioned they show difficulty in grasping the fundamental points of the lesson. Such pupils, indeed, may have "passed" in the work of the previous grade. Very likely they show lack of interest because of lack of understanding, and often give up trying to follow. They then either fall into a sort of dreamy state or listen hopelessly while the discussion passes entirely over their heads. Subsequent individual instruction is often necessary to enable them to continue with the subject. Third, there are the pupils who understand the teacher's first explanations. Often they are not given an immediate opportunity for self-expression, but are compelled to listen quietly while a second or third detailed explanation is given for the benefit of the less intelligent pupils. These pupils then either sit in a state of greater or less boredom or cast about for some mischief in which to expend their surplus energies.

It is becoming a well-recognized fact that a pupil who falls in the first group in one subject tends to fall in the same group in all

subjects, and that the same is true of pupils falling in the second or third groups. There may be, here and there, marked exceptions to this rule, but it is true in general. One is naturally led to the conclusion, therefore, that the pupils of the second type mentioned simply lack the general mental capacity to assimilate knowledge as rapidly as the other pupils, though their having passed the grade below would seem to indicate that if given sufficient time they could understand the subjects under discussion, at least fairly well. One is led to conclude also that the pupils of the third type mentioned possess a degree of native mental ability which enables them to acquire knowledge more rapidly than do their fellows.

This being the case, if it is possible to teach the "bright" pupils separately, so that they might progress as rapidly and to as great a degree of achievement as their capabilities would permit, then a great injustice is done them by holding them to the lockstep of the middle group. It is to these exceptional children that the nation must look for the creative genius and leadership by means of which society may evolve a greater civilization. Similarly, if the "dull" pupils could be taught separately at a slower rate of progress, which would permit them to keep up with the discussions, take an interest in the subjects, and learn all that their capabilities permitted, then, similarly, a great injustice is done these pupils by permitting them to more than waste their time in dragging through what is to them unintelligible discussion and to acquire the "habit of failure." The almost inevitable outcome of such maladjustment is the premature quitting of school and the consequent misfortune of a half-finished education accompanied by a feeling of malevolence toward the school and society.

Perhaps the chief purpose of intelligence measurement, then, is the scientific (as well as rapid and accurate) classification of pupils in regard to their native capacities to learn, in order to provide for the separate teaching of pupils of marked differences in ability to progress in school.

Intelligence tests of the feeble-minded. Until recently, intelligence tests have been used chiefly in the identification and grading of the feeble-minded. Here they were used for purposes quite parallel to those proposed above; namely, for classifying feeble-minded according to their ability to learn, in order that they might be properly grouped for the most effective instruction.

We might consider as belonging to a fourth type of school pupil, those who are of such low mentality as to be considered feeble-minded, who should be placed, for the good of themselves and the school, in a special institution designed to teach them in a manner best suited to their abilities. The elimination of the feeble-minded from the regular class is also a very important purpose of intelligence tests.

Intelligence tests for vocational guidance. We may never be able to determine by means of intelligence tests for what vocation, precisely, an individual is best adapted; but at least we know that certain vocations, particularly the so-called professions, require a certain high degree of intelligence, and we can say definitely that an individual of low mentality should be dissuaded from striving to enter such vocations as law, medicine, or university teaching. Moreover, a person of exceptional intelligence should be encouraged to enter a vocation requiring more than mediocre mental ability, in order that his capabilities may have opportunity for full development. By determining the degree of mentality of an individual, therefore, we can ascertain the probable maximum height of vocational or professional attainment which he may be expected to achieve, and can advise accordingly.

Beyond this we cannot go with measurement alone. There are many and various factors other than intelligence that govern an individual's fitness for this or that specific vocation. Whether John Jones, eighteen years of age and known to have, say, "average" intelligence, should be advised to enter the grocery business, salesmanship, auto repairing, song writing, plumbing, or to go to college, — if, indeed, he should be advised at all, —

depends upon his tastes and temperament, his previous experience, his special aptitudes as a result of the foregoing, his financial resources, the immediate opportunities, etc. Knowing these and his intelligence rating, vocational guidance becomes not a matter of measurement but of judgment.

Intelligence tests of prospective employees. Intelligence is no doubt a very important factor in the efficiency of an employee in most commercial institutions. To the extent, therefore, to which an employer wishes to know in advance the degree of mental ability of an applicant, intelligence ratings of such applicants have value to him. It is confidently predicted that intelligence ratings will soon be extensively used in selecting employees.

Intelligence tests of delinquents. It has been found that among criminals a much larger percentage are feeble-minded than among the population in general. Intelligence tests, therefore, may throw a light upon probable delinquency or potential delinquency. Given a doubtful case, if the person is found to be of a low order of mentality, the probability of his being either delinquent or potentially so becomes greater.

From an ethical point of view, also, it may be said that to the extent to which a child may be considered irresponsible for criminal acts, so also a convicted adult criminal with the mind of a child must be considered irresponsible. Intelligence tests may therefore help to determine proper punishment or remedial action.

Intelligence tests in the army. Tests embodying the principles of the present scale have been used upon more than a million and a half men upon their entry into the United States Army. Here the men were given a rating of A, B, C+, C, C—, D, D—, or E, according to the score made, and this rating was taken into account in the assignment of men to special or important duty, in the selection of candidates for officers' training schools, in recommendations for promotion or demotion, in case of trial for offense against military law, in case of apparent inability to adapt to military life, and in countless other situations where it was desired to have light

upon the general mental ability of a man or upon his probable capacity for mental achievement. For this purpose the tests have been found highly successful. A man receiving a rating of C or less was very seldom found capable of discharging the responsible duties of an officer, and a large percentage of men receiving ratings less than D were considered by the psychiatrists, upon later and individual examination, to be of such low mentality as to be unfit for military service.

The validity of the present scale. The scale is now in its fourth edition. For a discussion of its validity as a measure of that which we have called general mental ability, the reader must be referred to the more extensive treatises bearing on the subject. (See Arthur S. Otis, "An Absolute Point Scale for the Measurement of Intelligence," *Journal of Educational Psychology*, May and June, 1918, reprints of which may be obtained for 45 cents from Warwick & York, Baltimore, Maryland; and Lewis M. Terman, *The Measurement of Intelligence*, Houghton Mifflin Company, Boston.)

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OTIS GROUP INTELLIGENCE SCALE

A Point Scale devised by ARTHUR S. OTIS

Edition 1920

GENERAL PROCEDURE

The Otis Group Intelligence Scale is designed to test general mental ability. The scale is issued in two series, a Primary Examination and Advanced Examination. The Primary Examination is designed especially for the kindergarten and for Grades 1 to 4, and consists of eight tests which do not involve the ability to read. The Advanced Examination, consisting of ten tests (in the early editions printed in booklets designated "Examination Booklets"), is designed for Grades 5 to 12 — in fact, for all literate persons, including university students.

In each series each test is independent of every other test, but the tests taken together form a scale, which is printed in the form of an examination booklet. Because the tests will probably find their greatest usefulness in the schools, the persons who are being tested are often referred to as "pupils." This does not indicate, however, that the scales are unsuited for use outside of schools.

There are, in fact, in each series two complete scales, each independent of the other. These are designated as Form A and Form B in each series. While the two forms of each series are different in substance, they are similar in structure and the Total Scores of one are equivalent to those of the other. The purpose in constructing two independent scales in each series is to provide for reexamination after a short interval without the scores being influenced by memory of the previous examination, and also to prevent collusion between groups successively examined. Since the Binet Scale exists in but one form and this has been successfully administered to the same individuals over and over, it is believed that two forms of each series are ample for the above purposes.

The tests are administered consecutively, with time limits imposed upon each. In general, the number of correct responses

in each test constitutes the score in that test. The Total Score found by adding the Test Scores is the measure of the pupil's Intelligence.

A Table of Norms is furnished which gives the normal or expected score of a pupil of any given age. A pupil obtaining a score within a certain range of the norm for his age is considered "normal" or "average"; one whose score exceeds the norm by a considerable amount is considered "bright"; and one whose score falls considerably short of the norm is considered "dull."

A table is given which shows, for a pupil who has exceeded or failed to attain the norm for his age by any given amount, what percentage of pupils of his age he probably exceeds in Brightness. These considerations are explained fully below.

Provision is made for administering an abbreviated scale consisting of any number of the tests of the Advanced Examination which may be desired. The score in the abbreviated scale is then transmuted into terms of the whole scale.

It is also possible to administer the Otis Group Intelligence Scale as an individual examination. It is often advisable to supplement a group examination with an individual examination in certain cases where the examinee is believed to have failed, because of nervousness or other reason, to do himself justice in the group examination and also in cases where a very careful measure of Intelligence is especially desired.

The first page of each examination booklet constitutes an individual record sheet for each pupil. On this will be written his name, age, etc. — such data as may be required for identification and ease of reference. Provision is also made on this page for copying from the inside pages the scores in each test, for convenience in totaling, and for recording any additional data desired.

DIVIDING THE SCALE

The administration of the entire Otis Group Intelligence Scale usually requires a time longer than the ordinary recitation period.

When it is inconvenient to give the entire scale at one sitting, divide and administer in two sittings. The examination booklets should be distributed and the headings filled in as usual, and when the first half of the tests have been administered the booklets should be collected immediately so that the pupils may not acquaint themselves with the remaining tests. At a later period the examination booklets may be distributed again and the examination completed without in any way vitiating results. For young pupils this method is of advantage in that it prevents fatigue.

ABBREVIATING THE SCALE

Examiners often need for rapid-survey purposes a scale of less than ten tests. While of course no scale of less than ten tests is as accurate as the full ten-test scale, nevertheless a scale consisting of seven tests is sufficiently accurate for rapid-survey purposes.

For those who wish a scale of less than ten tests, provision is made below for the use of a scale consisting of any combination of any number of tests. The best selections of tests for nine-, eight-, and seven-test scales are obtained by dropping in order Tests 10, 1, and 6. These abbreviations will be called Abbreviations A, B, and C, respectively. In order to compare the scores of an abbreviation of the scale with the norms for the whole scale, it will be necessary, of course, to transmute these scores into terms of the whole scale. To provide for the ready use of Abbreviation A, B, or C, Tables 9, 10, and 11 have been prepared for transmuting scores in the abbreviations into terms of the ten-test scale. Opposite each score of the abbreviation is given the corresponding score in the ten-test scale.¹

¹ In the case of any individual taking an abbreviation of the scale, the ten-test score which is derived theoretically from his score in the abbreviation will deviate by a certain amount from his true ten-test score — that score which he would obtain if he took the whole ten tests. In the seven-test scale given below, for example, this deviation will amount in one half the cases to five points or more.

If any other abbreviation is desired, a table for transmuting scores into terms of ten-test scores may be constructed from the following formula¹:

$$TS = (ts + \Sigma A) \left(\frac{1}{1 - \Sigma B} \right), \quad \text{in which}$$

ts = total score in the abbreviated scale

TS = 10-test total score corresponding to that total score in the abbreviated scale

ΣA = the *algebraic* sum of the values of *A*, as given below, for those tests which are omitted in making the abbreviation

ΣB = the sum of the values of *B*, as given below, for those tests which are omitted in making the abbreviation

TEST	VALUE OF A	VALUE OF B
1	+4	.061
2	-5	.148
3	-4	.118
4	-5	.091
5	0	.094
6	+1	.056
7	+3	.078
8	+3	.075
9	-5	.188
10	+8	.091

REEXAMINING

The method of examining pupils in groups is subject, of necessity, to certain limitations. It is impossible for the examiner to be sure in every case that he has the full and undistracted attention at all times of all the pupils being tested. While it is impossible for a really dull person to make a good score in the examination, it occasionally happens that a pupil tested with others in a

¹ The correspondence as shown in the tables given for seven-, eight-, and nine-test scales deviates slightly at certain points from that represented by the formula. This is because the tables embody certain refinements which could not be simply expressed in the formula, which is therefore only approximate while the tables are exact.

group does not do himself justice. The most common reasons are nervousness, temporary confusion, or lapse of attention. For this reason, no score should be taken as absolute. Whenever the score of any pupil does not accord reasonably with the quality of his school work or other known facts about his mentality, he should be given further examination. Form B of the scale, in both series, is available for this purpose. Sometimes a second testing in a group will reveal the fact that he was capable of making a better score. If a second examination is given within a short time after the first, a slight allowance should be made for so-called practice effect. If a pupil makes a second score which is more than ten points above the first, however, it is probable that his first score was vitiated in some way and was therefore too low.

The first examination of either scale may be made with either Form A or B. When ordering examination booklets for *reexamination* always specify which form has been used for the first examination. This will insure against error in filling the order.

Causes which vitiate a pupil's score commonly have the effect of increasing the variability of the pupil's test scores. For example, if a pupil has one or two zero test scores or very low ones along with others considerably above zero, it is probable that these low scores are caused by factors other than mere lack of intelligence. In order to discover whether this is not the case, the pupil may be examined individually and given only those tests in which he failed badly. In any other puzzling case, especially when it may be necessary to pronounce a pupil feeble-minded, an individual examination should be given.

To administer the Otis Group Intelligence Scale as an individual examination, the examiner should first make sure that he has the full and undisturbed attention of the pupil. It is especially necessary that the pupil have confidence in the examiner and that he feel at ease. Under no other conditions will he do his best. Such introductory remarks as will place the examiner *en rapport* with the pupil are desirable. The examiner should then read to the

pupil the directions for the tests, exactly as in the group examination, and he should be allowed the same time limits as usual. " If the pupil does considerably better in this case, it may be assumed that the first score was vitiated in some way and the second one may be counted instead. If the pupil does inappreciably better, however, one is forced to conclude that his failure is due to lack of intelligence. In such a case it is often illuminating to take the same blank which has been used and ask the questions individually, giving additional explanation as to the meaning of the directions, if these seem not to be understood.

CONSIDERATIONS REGARDING GIVING OF DIRECTIONS

In giving the directions for these tests, it is essential that every point be clearly understood by every one who is capable of understanding. This can be assured in no other way than by giving the directions slowly and distinctly, with proper expression and emphasis. Before an examiner gives a test for the first time, he should practice on the directions several times, preferably with one or more listeners who are unfamiliar with the test. In order that the meaning of each sentence may be fully grasped, it should be followed by a pause. It is impossible to emphasize too strongly the need for these precautions. A good rule to follow is to allow a *pause of 2 seconds after every sentence*. The procedure may be considered as standardized only on the condition that the examiner adheres to this rule uniformly throughout the testing.

DIRECTIONS FOR ADMINISTERING THE PRIMARY EXAMINATION

To administer the Primary Examination, begin by addressing the pupils as follows: " We are going to pass you some booklets now and we will tell you pretty soon what you are to do with them. While they are being passed you may look at the first page, but do not open them until you are told to."

Have monitors pass the booklets, one to each pupil, right side

Directions for Administering Primary Examination 17

up. If the pupils can write, have them fill in the blanks, telling their names, birthdays, ages, etc. Give any help that will facilitate. It might be well to fill in the blanks beforehand on booklets for those pupils who cannot write.

Each examiner should number consecutively the examinations he gives, placing his initial before each number. Thus the tenth examination administered by Smith would be given the examination number, S-10, the eleventh, S-11, etc. The examination number identifies all who took the examination at the same time and place. The pupils should be directed to put the proper examination number in the blank space after "Examination Number."

When blanks are filled in, say,¹ "Now lay your pencils down and listen a moment, while I read to you about what you are to do. In these booklets are some pictures and drawings and other interesting things. We want to see if you can answer some questions about the pictures and drawings. Also you will be told to make certain marks in certain places in the booklets and we want to see if you can do exactly what you are told to do, and how quickly you can do it.

"Now in order to play this little game fairly, nobody must look to see what any one else is doing. That isn't fair. We want to find out what you can do all by yourself. You must listen very carefully to everything I say, so that you will be sure to hear the first time, because I will not repeat anything. Do not ask any questions. We will take one page at a time. I will tell you when to turn the page, and you must not turn any page until you are told to."

TEST I. FOLLOWING DIRECTIONS [*Form A*]

(For Form B, see below)

"Now turn over to the next page — the one with pictures of little men in the corners.² Here you see pictures of many things.

¹ All passages to be read to the pupils are given in bold type. For the sake of uniformity, these should be strictly adhered to.

² The examiner will realize that the administration of the test is standardized only when the directions are read at a standard rate. This is such that

I am going to tell you something to do with your pencils on this page, and I want to see if you can do exactly what I say. Listen carefully while I tell you what to do, and then do it as quickly as you can. Notice the pictures at the top of the page. (1) Now take your pencils and put a tail on the kitty that has no tail." (Pause 5 seconds.)

"Remember not to look around. That isn't fair.

(2) "Now look at the little man in the upper right-hand corner and draw a line for him to stand on." (Pause 5 seconds.)

(3) "Now look at the next row of pictures and draw a circle around the doll." (Pause 5 seconds.)

(4) "Next find the picture of something that can run, and draw a line under it." (Pause 5 seconds.)

(5) "Next find the picture that is between the doll and the candle and make a little cross under it." (Pause 5 seconds.)

(6) "Next find the picture of something that gives light and can be picked up. Make a round dot under it." (Pause 5 seconds.)

(7) "Next draw a line from the teddy bear's ear to the rabbit's ear that will go under the sun." (Pause 5 seconds.)

(8) "Next find the picture of a child's plaything that has large ears, and put a little circle under it." (Pause 10 seconds.)

(9) "Now notice the chicks and eggs and draw more eggs so that there will be as many eggs as there are chicks." (Pause 10 seconds.)

(10) "Next find the two chicks that look most alike and cross out the one between them." (Pause 5 seconds.)

(11) "Now notice the pictures of hands and draw a ring around the picture of a right hand." (Pause 5 seconds.)

(12) "Next, in the two rows of little drawings below the hands,

the reading of the first paragraph—without allowing time for turning the page—is slightly more than half a minute. The examiner should time his reading of this paragraph and gauge the rate of reading accordingly. If less than one-half minute is taken, the reading rate is too rapid and may vitiate the scores in the test.

Directions for Administering Primary Examination 19

cross out each circle that has a star under it." (Pause 10 seconds.)

(13) "Next make a dot in each square that is between two stars." (Pause 10 seconds.)

(14) "Now notice the large circle with a smaller circle in it. Put a cross in the space that is in the large circle but not in the smaller circle." (Pause 5 seconds.)

(15) "Next, in the middle drawing, put a cross in the space that is in all three circles." (Pause 5 seconds.)

(16) "Next, in the third drawing, in the corner, count *all* the circles, and write the number below the drawing." (Pause 10 seconds.)

TEST 2. ASSOCIATION [*Form A*]

"Now look at the next page. Notice the first row of pictures at the top of the page. There is a leaf with a little cross under it, an apple with a little circle under it, a banana with a line under it, a pear with an up-and-down line under it, and some cherries with a dot under them. You are to put the same marks under the same pictures below the line. Look at the next row of pictures. There you see an apple, banana, cherries, etc. Put a little circle under the apple, like the circle under the apple in the top row." (Pause 5 seconds.)

"Now put a line under the banana just like the line under the banana in the top row." (Pause 5 seconds.)

"Now put a little round dot under the cherries just like the dot under the cherries in the top row." (Pause 5 seconds.)

"Now put under the next banana the same kind of line that is under the other bananas." (Pause 5 seconds.)

"Now what goes under the apple? If you know, raise your hand." Call for an answer, and when the right answer is given say, "Yes, a little circle, the same as before. Put the little circle under the apple." (Pause 5 seconds.)

"Now put under the cherries the mark that belongs under them and do the same with the pear and apple." (Pause 10 seconds.)

"Then go right on with the other four rows and put under each picture the mark that belongs under it. Work fast and see how many you can get done before I say stop." After 1 minute say, "Stop. Lay down your pencils." (Pause.¹) "Turn to the next page."

TEST 1. FOLLOWING DIRECTIONS [Form B]

"Now turn over to the next page — the one with pictures of little men in the corners.² Here you see pictures of many things. I am going to tell you something to do with your pencils on this page, and I want to see if you can do exactly what I say. Listen carefully while I tell you what to do, and then do it as quickly as you can. Notice the pictures at the top of the page. (1) Take your pencils and put a tail on the kitty that has no tail." (Pause 5 seconds.)

"Remember not to look around. That isn't fair.

(2) "Now look at the little man in the upper left-hand corner and draw a line for him to stand on." (Pause 5 seconds.)

(3) "Now look at the next row of pictures and draw a circle around the rabbit." (Pause 5 seconds.)

(4) "Next find the picture of something that has hands, and draw a line under it." (Pause 5 seconds.)

(5) "Next find the picture that is between the sun and the rabbit, and make a little cross under it." (Pause 5 seconds.)

(6) "Next find the picture of something that grows but cannot see, and make a round dot under it." (Pause 10 seconds.)

(7) "Next draw a line from the doll's hand to the flower in the flower pot that will go under the candle." (Pause 5 seconds.)

¹ At this point there is no harm in relieving the disappointment of those who did not finish by asking, "How many finished the second row? Third row? Fourth row?" etc. Note when about half the hands have been lowered, and then say, "If you finished that many rows, you did very well."

A similar moment of relief and opportunity for questioning is permissible after each test, provided the examiner will see that no pupil takes the opportunity to look at the paper of another.

² See footnote under Test 1, Form A.

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(8) "Next find the picture of something that gives light but cannot be touched, and put a little circle under it." (Pause 10 seconds.)

(9) "Now notice the chicks and eggs and draw more eggs so that there will be as many eggs as there are chicks." (Pause 10 seconds.)

(10) "Next find the two chicks that look most alike and cross out the one between them." (Pause 5 seconds.)

(11) "Now notice the pictures of hands and draw a ring around the picture of a right hand." (Pause 5 seconds.)

(12) "Next, in the two rows of drawings below the hands, make a dot in each circle that is between two stars." (Pause 10 seconds.)

(13) "Next cross out each star that has a circle under it." (Pause 10 seconds.)

(14) "Now notice the large circle with a smaller circle in it. Put a cross in the space that is in the large circle but not in the smaller circle." (Pause 5 seconds.)

(15) "Next, in the middle drawing, put a cross in the space that is in the two lower circles but not in the upper circle." (Pause 10 seconds.)

(16) "Next, in the third drawing, in the corner, count *all* the circles, and write the number below the drawing." (Pause 10 seconds.)

TEST 2. ASSOCIATION [*Form B*]

"Now look at the next page. Notice the first row of pictures at the top of the page. There is a pair of scissors with a little cross under it, a ball with a little circle under it, a spoon with a line under it, a bottle with an up-and-down line under it, and a spool with a dot under it. You are to put the same marks under the same pictures below the line. Look at the first row of pictures below the line. There you see a ball, spool, spoon, etc. Take your pencils and put a little circle under the ball, like the circle under the ball in the top row." (Pause 5 seconds.)

"Now put a line under the spoon just like the line under the spoon in the top row." (Pause 5 seconds.)

"Now put a little round dot under the spool just like the dot under the spool in the top row." (Pause 5 seconds.)

"Now put under the next spoon the same kind of line that is under the other spoons." (Pause 5 seconds.)

"Now what goes under the ball? If you know, raise your hand." Call for an answer, and when the right answer is given say, "Yes, a little circle, the same as before. Put the little circle under the ball." (Pause 5 seconds.)

"Now put under the spool the mark that belongs under it, and do the same with the bottle and ball." (Pause 10 seconds.)

"Then go right on with the other four rows and put under each picture the mark that belongs under it. Work fast and see how many you can get done before I say stop." After 1 minute say, "Stop! Lay down your pencils." (Pause.¹) "Turn to the next page."

TEST 3. PICTURE COMPLETION [*Forms A and B*]

"On this page are twelve pictures. Something is left out of each picture. Look at the first picture and think what is left out. If you know, raise your hand." Call on a pupil for the answer. Then say, "Yes, one eye is left out. Draw in the eye where it should go." (Pause 5 seconds.) "Now there is just one thing left out of each picture. Look at each of the other pictures and, as quickly as you can, draw in what is left out. See how many you can get done before I say 'Stop.' Ready, go." After 2 minutes say, "Stop! Lay your pencils down and look at the next page."

TEST 4. MAZE [*Forms A and B*]

"Here you see pictures of little square boxes with walls in them and little paths between the walls. In the box in one upper corner

¹ See footnote under Test 2, Form A.

you see a little mouse, and in the other upper corner is a piece of cheese. And there is a line from the mouse to the cheese, showing just how the mouse would have to go, around through the paths, to get to the cheese. The line shows the *only* way to get to the cheese. If the mouse went into any other path, he would run up to a wall and have to turn and go back to the right path.

"Now you will see another piece of cheese in the box in the *lower* corner of the page. How would the mouse get to that piece of cheese? When I say 'Ready,' you are to draw a line to show just where the mouse would have to go to get to this other piece of cheese, in the lower corner. Be very careful not to go into any wrong path. See how far you can get before I say 'Stop,' without crossing over any wall or going into any wrong path. Ready, begin." After 2 minutes say, "Stop! Lay your pencils down." (Pause if desired.) "Turn to the next page."

TEST 5. PICTURE SEQUENCE [*Forms A and B*]

"Look at the three pictures at the top of the page. They tell a little story about a bird building a nest and hatching out some little birds. You can see that the pictures are not in the right order. Think which one should come first." Call on a pupil, and when the right answer is given, say, "Yes, the bird has to build her nest first, so put a figure 1 in the picture where the bird is building her nest. Put it in the small square in the lower corner of the picture." (Pause 5 seconds.) "Now which picture comes next?" Call on a pupil, and when the right answer is given, say, "Yes, so put a figure 2 in the picture of the nest with the eggs in it, and put a figure 3 in the picture of the nest with the little birds in it. Always put the number in the small square in the corner of the picture." (Pause 5 seconds.) "Now you are to do the same with all the other rows of pictures. In each row, find the picture that should come first and put a figure 1 in the corner of that picture. Then put a figure 2 in the picture that should come next, and so on. See how many rows you can get done before I

say 'Stop.' Go ahead." After 2 minutes say, "Stop! Lay your pencils down and look at the next page."

TEST 6. SIMILARITIES [*Forms A and B*]

"Look at the first row of pictures. You will see that they are all little wooden blocks. The three blocks together on this side with little crosses under them (hold up booklet and point so all may see) are *alike*, because they are all square blocks with letters on them. How many see another block in that row that is like the first three? Raise your hands." Call on pupil, saying, "Which one is it?" When the right answer is given, say, "Yes, it is the one with the letter K on the front, isn't it? and there is a little cross in the corner to show that that is the right answer."

"Now look at the second row of pictures. The first three, that have little crosses under them, are alike. Look at the other five and pick out the right answer — the one that is *most like* the first three. Put a cross in the little square in the corner under the answer." (Pause 5 seconds.)

"Now in each row below, in the same way, look at the first three pictures and see how they are alike, then put a cross under the answer — the one that is *most like* the first three. Remember, there is only *one* right answer in each row. Go ahead and work fast." After 2 minutes say, "Stop! Turn over to the last page." (Pause for short rest, if desired.)

TEST 7. SYNONYM-ANTONYM [*Forms A and B*]

"Notice on the side of the page the letters A, B, C, D, E, and so forth, and after the letter A the letters S and O, and after B the letters S and O, and so on. The letter A stands for two words I shall read. You are to think whether they mean the same, like *quick* and *fast*, or whether they mean the opposite, like *yes* and *no* or like *good* and *bad*. If they mean the same, you are to draw a line around the letter S, after the A. But if they mean the oppo-

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site, you are to draw a line around the letter O. The two words are *up* and *down*. Should you draw the line around the S or the O?" Call on pupil, and when right answer is given, say, "Yes, *up* and *down* mean the opposite; so draw a line around the O." (Pause 5 seconds.) "Now we will go on in the same way." (For Form B, see below.)

[Form A]

"Question B. Put your finger on B — the two words are *large* and *big*. Draw the line around the right letter to show whether they mean the same or the opposite." (Pause 5 seconds.)

"Question C. Put your finger on C — the two words are *pleasant* and *agreeable*." (Pause 5 seconds.)

"Question D. *North* and *south*." (Pause 5 seconds.)

"Question E. *Strange* and *common*." (Pause 5 seconds.)

"Question F. *Empty* and *vacant*." (Pause 5 seconds.)

"Question G. *Awkward* and *clumsy*." (Pause 5 seconds.)

"Question H. *Sensible* and *foolish*." (Pause 5 seconds.)

"Question I. *Same* and *different*." (Pause 5 seconds.)

"Question J. *Courage* and *bravery*." (Pause 5 seconds.)

[Form B]

"Question B. Put your finger on B — the two words are *fall* and *high*. Draw the line around the right letter to show whether they mean the same or the opposite." (Pause 5 seconds.)

"Question C. Put your finger on C — the two words are *ordinary* and *common*." (Pause 5 seconds.)

"Question D. *Pleasant* and *disagreeable*." (Pause 5 seconds.)

"Question E. *Forget* and *remember*." (Pause 5 seconds.)

"Question F. *Deceive* and *lie*." (Pause 5 seconds.)

"Question G. *Liberty* and *freedom*." (Pause 5 seconds.)

"Question H. *Same* and *opposite*." (Pause 5 seconds.)

"Question I. *Capture* and *escape*." (Pause 5 seconds.)

"Question J. *Justice* and *fairness*." (Pause 5 seconds.)

TEST 8. COMMON SENSE [*Forms A and B*]

"Now notice on the other side of the page the letters K, L, M, N, O, and so on, and after each letter the numbers 1, 2, and 3. Each letter stands for a question I shall read to you. I am going to read three answers to each question. If answer No. 1 is the right one, you are to draw a line around the number 1. If answer No. 2 is the right one, draw a line around the number 2. But if answer No. 3 is the right one, draw a line around the number 3. The first question is: Why do birds build nests? These are the answers. Think which is the right one. Answer No. 1: Because they like to work. Answer No. 2: To make a place to lay their eggs. Answer No. 3: To keep other birds away. Now which is the right answer, No. 1, 2, or 3?" Call on a pupil, and when the right answer is given, say, "Yes, answer No. 2 is the right one, because birds build their nests to lay their eggs in. So draw a line around the number 2 after the letter K." (Pause 5 seconds.) (For Form B see below.)

[*Form A*]

"Now I will read question L. Keep your finger on the letter L while I read. Think which answer is the right one and draw a line around the right letter. Question L: If you hurt some one without meaning to, what should you do?

One: Say you didn't do it.

Two: Beg his pardon.

Three: Run away." (Pause 5 seconds.)

"Question M: Why is it a good thing to brush our teeth?

One: So we can have a toothbrush.

Two: Because tooth paste has a pleasant taste.

Three: To keep our teeth clean and white." (Pause 5 seconds.)

"Question N: Why do people take baths?

One: They enjoy it.

Two: To make use of the bathtub.

Three: It is healthful." (Pause 5 seconds.)

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“ Question O : Why would* most people rather have an automobile than a horse and carriage ?

One : Automobiles have rubber tires.

Two : They go faster.

Three : They use gasoline.” (Pause 5 seconds.)

“ Question P : Why do men tip their hats when they meet women they know ?

One : They learned to do it when they were boys.

Two : It is considered polite.

Three : To show their hair is brushed.” (Pause 5 seconds.)

“ Question Q : Why do teams keep to the right side of the street ?

One : It is the custom and is easier for them to pass one another.

Two : The road is smoother on that side.

Three : The horses are not so likely to be frightened.” (Pause 5 seconds.)

“ Question R : Why are streets lighted at night ?

One : So people can see where they are going.

Two : Because children are afraid of the dark.

Three : Because dark streets are colder.” (Pause 5 sec.)

“ Question S : In what way are fish like pigeons ?

One : They have feet to walk with.

Two : They have two eyes.

Three : They can swim and fly.” (Pause 5 seconds.)

“ Question T : Why should we not pick up a kitten by its tail ?

One : It doesn't look well.

Two : It hurts the kitty.

Three : Its tail might come off.” (Pause 5 seconds.)

“ Now lay your pencils down and turn your booklets over to the front page.” Have monitors collect the booklets:

[Form B]

“ Now I will read question L. Keep your finger on the letter L while I read. Think which answer is the right one and draw a

line around the right letter. Question L: Where is the sun at night?

One: It is behind heavy clouds.

Two: It is on the other side of the earth.

Three: It has set in the ocean." (Pause 5 seconds.)

" Question M: If you buy two cents' worth of candy and give the store man a nickel, how many pennies should he give you back?

Answer No. 1: One penny.

Answer No. 2: Two pennies.

Answer No. 3: Three pennies." (Pause 5 seconds.)

" Question N: If you gave a newsboy twenty-five cents for a three-cent newspaper, what would be the right change?

One: Three nickels.

Two: Two dimes.

Three: Two dimes and two pennies." (Pause 5 seconds.)

" Question O: Which would most people rather hear?

One: A factory whistle.

Two: A piano playing.

Three: A church bell." (Pause 5 seconds.)

" Question P: When is the best time to mend a leaky roof?

One: While it is raining.

Two: As soon as the roof is dry after the rain.

Three: Just before it rains again." (Pause 5 seconds.)

" Question Q: There is a saying that it is hard to teach an old dog new tricks. This means,

One: It is easier to learn while we are young.

Two: New tricks are hard to teach.

Three: Dogs do not learn tricks easily." (Pause 5 seconds.)

" Question R: What does pity mean? — pity.

One: To feel sorry for some one.

Two: To hate some one.

Three: To give a beggar food." (Pause 5 seconds.)

" Question S: There is a saying that a stitch in time saves nine. It means,

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One : It will save nine dollars.

Two : It is better to mend small tears before they get bigger.

Three : Be careful not to tear your clothes." (Pause 5 seconds.)

" Question T : There is a saying: ' Don't cry over spilt milk.'
It means,

One : Crying does not bring back the milk.

Two : It is foolish to worry over things we can't help.

Three : The tears might fall in the milk." (Pause 5 seconds.)

" Now lay your pencils down and turn your booklets over to the first page." Have monitors collect the booklets.

DIRECTIONS FOR ADMINISTERING THE ADVANCED EXAMINATION

To administer the examination begin by addressing the pupils as follows:¹ **" We are going to give you this morning (afternoon) some new and interesting tests. The tests are in these booklets which we shall pass to you. There are some blanks to be filled on the front page, and afterward you will be told how to answer the tests. Do not open the booklets until you are told to. Leave them closed on your desks till you are told what to do with them. Part of the test is to see if you can follow directions."** Have monitors pass the booklets, right side up, one to each pupil. See that all have pencils — two, if convenient — and erasers.

Each examiner should number consecutively the examinations he gives, preceding each number by his initial. Thus the tenth examination administered by Smith would be given the examination number, S-10, the eleventh, S-11, etc. The examination number identifies all who took the examination at the same time and place. While the booklets are being passed, write on the blackboard the examination number, as explained above. When ready, say: **" Now notice, on the first line, where it says Exam-**

¹ When the examination is administered to persons other than school pupils, the wording may be altered slightly to suit.

ination Number, and in the blank space write what you see here on the blackboard, capital (A), dash, (1) " (or whatever your examination number is). (Pause.) " Then fill in the other blanks down to the black line across the page. Write very plainly; print your name if you can. When you have finished filling the blanks down to the black line, lay your pencils down and fold your arms. Do not open the booklets." Make any necessary additional explanations for young children.

The space indicated for remarks or further data may be used by the examiner or teacher to record during or after the examination any special information concerning home conditions, sickness, etc., or any irregularities in the examination, such as a pupil's being excused, apparent cheating, misunderstanding of directions, nervousness, etc. If desired for special investigations, the pupils may be directed to write on specified lines their addresses, fathers' occupations, brothers and sisters in school, grades skipped or repeated, or other supplementary data.

It will be well to bring to the examination room a Record Sheet which may be used afterward to record the scores of those tested, and on the back of this sheet to make any notes that seem of value, such as the hour of the examination, number of pupils tested, number of pupils absent or excused, disposition of the pupils, evidences of collusion, interruptions, other irregularities, notes on possible betterment of procedure, etc. At the conclusion of the examination the Record Sheet may be placed inside the top booklet for use when the tests have been scored.

When all have finished filling the blanks on the front of the booklet, say,¹ " **Now every one give attention while I explain further about this examination.**" (Get the attention of every one before proceeding.) " **There is a list of questions or problems on each page. The first list is called Test 1, the second Test 2, etc. You will all begin each test at the same time and stop at the same**

¹ All passages to be read to the pupils are given in bold type. For the sake of uniformity, these should be strictly adhered to.

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time. Before you begin each test, I will explain how you are to answer the questions. And while I am explaining, you will hold your pencils up like this." (Show how, holding the pencil on a level with the head.) "You may rest your elbows on the desks if you wish. When I have finished the explanation I will say, 'Ready, go.' Keep your pencils up until I say 'Go.' Then you will all start together. You will be told only once what to do in each test, so listen closely. Do not ask any questions. If for any reason you do not know what to do, do what you think is meant to be done. The test is partly to see if you understand what to do after being told once. You may read the directions at the top of the page again if you wish. Do not look at any other pupil's paper to see what is written on it. Do not even look in the direction of any other paper. Keep your eyes on your own paper. Each time you turn a page, fold the book back like this (show) so that only one page shows. Do it quickly, then bring your pencil up like this (show again) as I said. Now remember these four rules: First, keep your pencils up until I say 'Go.' Second, don't ask any questions. Third, don't look toward any other paper. And fourth, don't turn your booklet over or turn any page unless you are told to. If you forget any of these rules, it counts off from your score.¹ Now turn over to Test 1, on the next page. See that it says Test 1 at the top of the page." (If any are slow, say, "Quickly, get the place and bring your pencils up.")

TEST 1. FOLLOWING DIRECTIONS

When all pencils are up, say, "This test is to see how well you can follow directions. Notice the alphabet near the top of the page. Each of the directions printed below tells you to write a

¹ If during the examination any pupil shall persistently forget or apparently deliberately ignore any one of these four rules, a note should be made of each such delinquency on the pupil's examination booklet. This may be done by crossing out the answer to the appropriate item (1, 2, or 3) in the test or by placing on the margin of the page the symbol, -1, inclosed in a circle. When

certain letter of the alphabet. Always write it in the parentheses after the problem, as shown in the sample just below the alphabet. The sample problem says, 'Write the fifth letter of the alphabet.' The fifth letter of the alphabet is E; so the letter E is placed in the parentheses after the problem. In writing these letters always use capitals, and make them like printed capitals so that they can be read easily. When I say, 'Go,' begin with No. 1, just below the line that is drawn across the page, and keep on till I say, 'Stop.' You will have just 5 minutes. No one is expected to finish all the directions, but do as many as you can. Ready, go!"

After 5 minutes say, "Stop! Turn over your books this way (show) to Test 2 on the next page. See that it says Test 2 at the top. Quickly, then bring your pencils up."

TEST 2. OPPOSITES

When all pencils are up, say, "This is a test to see if you know the opposites of certain words. For example, look at the first sample problem near the top of the page. The first word on the line is *up*. Think what is the opposite of *up*. The opposite of *up*, of course, is *down*. And *down* is one of the five words in parentheses on the same line, and it is underlined.

"In each of the problems below, one of the five words in the parentheses is intended to mean exactly the opposite of the first word on the line. The directions say, 'Look at the first word on each line, think what word means exactly the opposite of it, find that word among the five words in the parentheses on that line, and draw a line under it.'

"Now look at the second sample. The first word on the line is *hot*. Think what is the opposite of *hot*. The opposite of *hot*, of course, is *cold*. And the word *cold* in the parentheses is underlined.

Test 1 is scored, one point should be deducted from the score for each such notation. Similarly Item 1 should be marked wrong in scoring if the directions implied in it have not been followed.

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"In this way, you are to look at the first word on each line, think what word means exactly the opposite of it, find that word among the five in the parentheses on the same line, and draw a line under it.

"When I say, 'Go,' begin with No. 1 and keep on till I say, 'Stop.' You will have only a minute and a half this time. Ready, go!" After $1\frac{1}{2}$ minutes say, "Stop! Turn over one page, quickly, to Test 3." (See that all books are folded back.)

TEST 3. DISARRANGED SENTENCES

When ready, say, "Below are some sentences. The words in each sentence are mixed up so that they do not make sense. Look at the first sample: *money, for, work, men*. These words would make a sentence if put in the order, Men work for money. This statement is true; so the word *true* on that line is underlined. Notice the second sample: *uphill, rivers, flow, all*. To make a sentence of these words they should be put in the order, All rivers flow uphill. This statement is false; so the word *false* is underlined.

"Every one look at the third sample and think whether you would underline *true* or *false*." (Pause 10 seconds.) Then say, "You would underline *true*, because the sentence is, 'The ocean has waves,' and that is true.

"Now, as the directions say, the words in each line below would make one sentence. Some of the sentences would be true and some would be false. You are to look at the words on each line and decide what sentence they would make, using all the words, but *do not write the sentence*. Then, as the directions say, if the sentence the words would make is *true*, underline the word *true* at the side of the page. If the sentence they would make is *false*, underline the word *false*. You will have a minute and a half, Ready, go!" After $1\frac{1}{2}$ minutes say, "Stop! Turn your books over to Test 4."

TEST 4. PROVERBS

"On this page are two groups of proverbs, each group containing 10 proverbs. Each proverb in Group 1 is explained by one of the statements in the group just below the proverbs. There are 10 statements to explain the 10 proverbs and 2 extra statements which do not explain any proverbs, making 12 statements in the group. The same is true of the second group of proverbs and the second group of statements. The test is to find the statement that explains each proverb. The directions say, 'Read each proverb, find the statement that explains it, and put the number of that statement in the parentheses before the proverb.' For example, look at the first proverb": (Read Form A only or Form B only.)

[Form A] "Make hay while the sun shines.

[Form B] "The early bird catches the worm.

"Now look at the statements. Statement No. 1 says:

[Form A] "It pays to attend to our troubles before they get worse.

[Form B] "It is foolish to worry about things we can't help.

"If Statement No. 1 explains the first proverb, put a figure 1 in the parentheses before the proverb. If not, look at Statement No. 2.

[Form A] "Leadership is easy when all goes well.

[Form B] "People seek the company of those who are like them.

"If Statement No. 2 explains the first proverb, put a figure 2 in the parentheses before the proverb. If not, read on till you find the statement that does explain it and write the number of that statement in the parentheses before the proverb. Then take the next proverb and do the same, etc.

"When you have finished the first 10 proverbs, go right on to the next 10 in Group 2. The statements which explain these are among the 12 statements below the proverbs in Group 2. Answer these in the same way. Make your figures very plain. You will have 6 minutes. Ready, go!" After 6 minutes say, "Stop! Turn over one page to Test 5."

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TEST 5. ARITHMETIC

"This test is a list of ordinary arithmetic problems. Work each one as you would any arithmetic problem. The directions say, 'Place the answer to each problem in the parentheses after the problem. Do any figuring you wish on the margin of the page.' You will have 6 minutes. Ready, go!" After 6 minutes say, "Stop! Turn your books over to Test 6."

TEST 6. GEOMETRIC FIGURES

"This is a test to see if you can find certain numbers in the geometrical figures near the top of the page. The directions say, 'Each problem asks a question that is answered by a number. Write the answer to each problem in the parentheses after the statement of the problem.' For example, the sample problem says, 'Look at Fig. I.' (Fig. I is the smaller drawing, in the middle of the page.) Then it says, 'What number is in the circle but not in the rectangle?' Now you will see that the number that is *in the circle but not in the rectangle* is the number 1, therefore a figure 1 has been placed in the parentheses after the statement of the problem.

"In that way, find the answer to each problem and write it in the parentheses. You will have 6 minutes. Ready, go!" After 6 minutes say, "Stop! Turn over one page to Test 7."

TEST 7. ANALOGIES

"To understand this test look at the first sample problem: finger, hand, toe, and then a question mark. As the directions say, the first sample means: a finger is to a hand as a toe is to what, and you are to think what that is. The answer is one of the five words following on the same line. The directions say, 'Underline the word on each line that should go in the parentheses in place of the question mark.' Now, in this case, a *finger* is to a *hand* as a *toe* is to a *foot*, because a finger is *part* of a hand and,

in the same way, a toe is *part* of a foot. Therefore the word *foot* is underlined. Now notice the second sample: *Clothes* are to *man* as *fur* is to what? Here the right answer is *animal*, because *clothes* keep a *man* warm and in the same way *fur* keeps an *animal* warm. Therefore the word *animal* is underlined. Now look at the third sample. Read it and think which word you would underline." (Pause 10 seconds.) "*Short* is the *opposite* of *tall*, and the opposite of *fat* is *thin*. So you would underline the word *thin*. Some of the problems, as, for example, Problem 4, read a little differently. Problem 4 simply means:

[Form A] "Coal is to a locomotive as what is to an automobile?"

[Form B] "A boy is to a man as what is to a sheep?"

"It is answered in the same way. You will have 3 minutes. Ready, go!" After 3 minutes say, "Stop! Turn your books over to Test 8."

TEST 8. SIMILARITIES

"This is a test to see if you can tell the ways in which certain things are alike. For example, look at the samples. Notice the first three things mentioned in Sample 1: *hat*, *collar*, *glove*. Think how these are alike. You see they are alike because they are all *things to wear*. Now find one of the other five things mentioned on that line that is also a thing to wear. You see that it is *shoe* and *shoe* is underlined. The directions just below the samples say, 'Find the way in which the first three things on a line are alike. Then look at the other five things on the same line and draw a line under the one that is most like the first three.'

"Now look at the second sample. Think how the first three things are alike: *rose*, *daisy*, *violet*. You see they are all alike because they are all *flowers*. Now look at the other five words on that line and find the name of a flower. You see the name of the flower is *pansy*, so *pansy* is underlined.

"Now look at the third sample and think what word you would underline." (Pause 10 seconds.) Then say, "*Table* should be

underlined, because *desk*, *bed*, and *chair* are articles of furniture and the article of furniture mentioned among the other five is *table*.

"When you get down to the drawings, do exactly the same. That is, find the way in which the first three on each line are alike and draw a line under the one of the other five that is *most* like the first three. The first line of drawings is a sample problem. You will have 4 minutes. Ready, go!" After 4 minutes say, "Stop! Turn over one page to Test 9."

TEST 9. NARRATIVE COMPLETION

"This page contains a story with a number of the words left out. You will notice that some of the blanks are numbered. The test is to see if you can tell what words should go in the numbered blanks. Thus you will see that the story reads:

[Form A] "Once upon a (blank No. 1) there was a (blank No. 2) that lived in a (blank No. 3)," etc.

[Form B] "Once upon a (blank No. 1) there was a (blank No. 2) who was very (blank No. 3, etc.).

"The words that should go in the numbered blanks are among those in the list at the right. The word that goes in the blank numbered 1 is one of the three words opposite the number 1 —

- { [Form A] time, place, man.
- { [Form B] time, place, tree.

The word that belongs in the blank numbered 2 is one of the three words opposite the number 2 —

- { [Form A] man, lion, dog.
- { [Form B] bird, man, woman.

The word that belongs in the blank numbered 3 is one of the three words opposite the number 3 —

- { [Form A] street, garden, forest.
- { [Form B] rich, strong, poor.

etc. The directions say, 'For each numbered blank in the story, choose the *best* word of the three in the list having the same number as the blank, and *underline* the word you choose. You may write these words in the blank spaces if it will help you, but be sure to underline the words in the list. You need do nothing about the blanks that are not numbered.' Now before you do any underlining, read the first two paragraphs, to see what the story is about. Then underline the right words in the list. The first word you will underline, of course, is the word *time*. You will have 6 minutes. Ready, go!" After 6 minutes say, "Stop! Do not turn over your books. Leave them as they are. Lay your pencils down and fold your arms."

TEST 10. MEMORY

"Listen carefully while I explain what you are to do in the next test. This is a test to see if you can remember a story that is told you. I will read a story, and then when you turn over to the next page you will find questions about the story.

(For *Form A* continue here. For *Form B* skip to page 40 and continue where indicated.)

"The questions will be like these: Was the story about a king? Was the king's daughter sixteen years old? Was she ugly? Was the king fond of hearing stories? etc.

"Now listen carefully while I read the story and see how much of it you can remember. The name of the story is, 'The Story That Would Last Forever.' And this is the story:¹

"Once upon a time there was a king who was very fond of hearing stories. He liked them so well that one day he said, 'If any one can tell me a story that will last forever he may marry my daughter and take half my kingdom, but if he fails he shall have his head cut off.'

"Now the king's daughter was very pretty and very lovable, and so many young men wanted to win her for a wife. [$\frac{1}{2}$ minute.]

¹ The reading of this story should consume approximately 3½ minutes.

Soon a young man came and offered to tell the king a story. He talked all that day and all the next day and all the next day, and so on. But at the end of seven days his story came to an end and he could not think of any more to add to it; so his head was cut off. Then another young man came and offered to tell the king a story. At the end of seven days he was still telling his story, but at the end of the fourteenth day his story came to an end, and he could not think of any more to add to it; so his head was cut off. [1 minute, 5 seconds.] After that many other young men tried to tell a story that would last forever, but after a month, or two months, or three months, their stories came to an end, and they could not think of any more to add to them; so their heads were cut off. [1 minute, 25 seconds.]

“ Finally a handsome young man came and said to the king, ‘ I can tell you a story that will last forever.’ The king’s daughter begged the young man not to try, for she was afraid that he too would fail, and she did not want to have another fine young man killed. But the young man said, ‘ Have no fear, Princess, I will not fail,’ and he began to tell the king this story: ‘ Once upon a time a rich man ordered a huge granary built’ [2 minutes]—a granary is a storehouse for grain — ‘ and had it filled with wheat to the tip top. But when it was built there was still a very small hole, between the boards, near the ground, just big enough to let one little ant through. One day a little ant went in and carried off a grain of wheat. Then another little ant went in and carried off another grain of wheat. [2½ minutes.] Then another little ant went in and carried off another grain of wheat.’ And so on. Day after day, week after week, the story teller kept saying, ‘ Then another little ant went in and carried off another grain of wheat.’

“ At last the king grew tired of hearing the same thing over and over, and pleaded with the young man to tell him what happened after that. But the young man only said, ‘ Why, after that another little ant went in and carried off another grain of wheat.’ [3 minutes.]

"Finally the king said, 'Man, man, you will drive me crazy. Take my daughter and half my kingdom and never mention ants to me again.'

"So the young man married the princess, and they lived happy ever afterward. And the king never asked any one after that to tell him a story that would last forever." [3½ minutes.]

When you have finished reading the story, say, "Now turn your books over to Test 10." When ready, say, "Now look at the samples. The first sample question reads: 'Was the story about a king?' and the answer, of course, is *yes*; so *yes* is underlined at the right. The next question reads: 'Was the king's daughter 16 years old?' and you don't know, because the story didn't say how old she was. So the words *didn't say* are underlined. The next question reads: 'Was she ugly?' The story said she was pretty, so the answer to that question is *no*, and *no* is underlined.

"Now, as the directions say, read each question, and if the right answer, according to the story, is *yes*, draw a line under the word *yes*. If the right answer is *no*, draw a line under the word *no*. But if you do not know the right answer because the story didn't say, draw a line under the words *didn't say*. You will have 3 minutes. Ready, go!" After 3 minutes say, "Stop! Close your books. Lay your pencils down."

Have the monitors collect the booklets, keeping all right side up. Tie up the pile of booklets, with the Record Sheet placed inside the top booklet.

(For *Form B* continue here.)

"The questions will be like these: Was the story about two shepherds? Were they both honest? Were they brothers? Did the first shepherd have a large flock of sheep? etc.

"Now listen carefully while I read the story and see how much of it you can remember. The name of the story is 'The Two Shepherds.' And this is the story:¹

¹ The reading of this story should occupy approximately 3½ minutes.

"Once upon a time in a small village there lived two shepherds. One of them had only a few sheep in his flock, but they had fine white wool. He knew them so well that he called each one by name. He had no shepherd dog to watch his sheep and keep them from getting lost, so he had to watch them very carefully himself. He followed them from place to place while they sought fresh grass. [$\frac{1}{2}$ minute.]

"One day he was very tired and lay down under a tree to take a nap. He thought he would sleep only a little while and that when he awoke he would find his sheep not far away. But he slept so long that when he awoke he could not see his sheep. He hunted all the rest of the day and could not find them anywhere. When night came he sat down and wept over the loss of his sheep. [1 minute.]

"Mercury saw him weeping, and came up to him and said, 'Why do you weep, my good shepherd?'

" 'I have lost my sheep,' said the shepherd.

" 'Come with me,' said Mercury, 'and I will help you find them.' Then Mercury led the shepherd to a distant pasture surrounded by a forest, and there they saw a flock of sheep with silver fleece. 'Are these your sheep?' asked Mercury.

" 'No,' said the shepherd. Then they went farther. In another pasture they found a flock of sheep with golden fleece.

" 'Are these your sheep?' asked Mercury.

" 'No,' said the shepherd. Then they went farther and found a little flock of sheep with fine white wool. 'Ah! Here are my sheep,' said the shepherd; 'I know them, every one.' And he called them by name.

"Mercury was pleased that the shepherd loved his sheep better than gold and silver, and to reward him he gave the shepherd all the sheep they had seen. [2 minutes.]

"When the other shepherd saw the sheep with the gold and silver fleece, he was very envious and asked the shepherd where he had found them. When he told the story, the other shepherd at

once resolved to try to get for himself some sheep with gold and silver fleece. So the next day he tied up his shepherd dog, took his sheep to pasture, and lay down to sleep. When he awoke, his sheep too had strayed away. He began at once to sob loudly. Mercury, hearing him, came up and said, 'Why do you weep, my good shepherd?'

" 'I have lost my sheep,' said the shepherd.

" 'Come with me,' said Mercury, 'and I will help you find them.' Then Mercury led the shepherd to a distant pasture, where they found a flock of sheep with silver fleece. [3 minutes.] 'Are those your sheep?' asked Mercury.

" 'Yes,' said the shepherd, 'but not all of them.' In another pasture they found a flock of sheep with golden fleece.

" 'Are these your sheep?' asked Mercury.

" 'Yes,' said the shepherd, 'these are the rest of my sheep.' Whereupon Mercury said, 'You are a dishonest man. These are not your sheep. Now you may go and try to find your own sheep. But you will never find them.'

" That is the end of the story. Now turn your books over to Test 10." When ready, say, "Now look at the samples. The first sample question reads: 'Was the story about two shepherds?' and the answer, of course, is *yes*; so the word *yes* is underlined. The next question reads: 'Were they both honest?' and the answer is *no*; so the word *no* is underlined. The next question reads: 'Were they brothers?' but you don't know, because the story didn't say whether they were brothers or not; so the words *didn't say* are underlined.

" Now, as the directions say, read each question and if the right answer, according to the story, is *yes*, draw a line under the word *yes*. If the right answer is *no*, draw a line under the word *no*. But if you don't know the right answer because the story didn't say, then draw a line under the words *didn't say*. You will have 3 minutes. Ready, go!" After 3 minutes, say, "Stop! Close your books. Lay your pencils down. Now each one pick up the

slip of paper that you wrote your name on first. Put it right side up under the first page of your book. Then close your book."

Have the monitors collect the booklets, keeping them all right side up. Tie up the pile of booklets, with the Record Sheet placed inside the top booklet.

DIRECTIONS FOR SCORING PRIMARY EXAMINATION

GENERAL PLAN

Each test consists of a certain number of items, defined below. Each item is answered either right or wrong; if right it counts one point, if wrong no points. There are no partial credits. Erasures and corrections are permitted in all tests but Test 4. The number of items in the eight tests are respectively 16, 12, 12, 10, 7, 8, 10, 10, making a total possible score of 85 points.

The correct answers to the items of Tests 1, 3, 5, 6, 7, and 8 are shown in the back of the Manual (pages 58 to 62). The correctness of items of Tests 2 and 4 are self-evident. It should be noted that the correct answers in Tests 6, 7, and 8 appear in a regular manner which renders the use of stencils unnecessary and aids in quickly detecting incorrect answers. It is suggested that each correct item be indicated by a check mark (✓) or each incorrect item by a cross (×), or that both checks and crosses be used. The score in each test (number of items answered correctly) is to be placed on the dotted line in the lower corner of the page. These will be copied afterward on to the front page of the booklet or on to the Record Sheet. The sum of the test scores constitutes the Total Score — the measure of the pupil's Intelligence.

SPECIAL DIRECTIONS

Test 1. There are 16 items, corresponding respectively to the 16 directions given for the test. Score each according to the *apparent intent* of the pupil, disregarding crudeness of drawing.

Item 1. In this item, for example, anything resembling a tail attached to the proper drawing of a cat will count as correct.

Items 3 to 8. It may happen that in addition to the correct symbol under some drawing, the pupil has placed another and incorrect symbol. This latter should be disregarded and if otherwise correct the item should be counted right. Thus, in Form A, if a circle has been placed under the teddy bear, which is correct, and also a cross, which is incorrect, the item will count as correct.

Items 10 and 11. If more than one chick or hand is crossed out, the item counts as wrong.

Items 12 and 13. If in either item more than the two correct drawings are crossed out or dotted, the item counts as wrong.

Items 14 and 15. The symbols must be wholly within the correct spaces and there must be no other marks in the drawings.

Test 2. In the first row the first two drawings count as one item, the second two as one item, etc., making four items in the first row. In each succeeding row the first four drawings count as one item and the second four as one item, making two items in each row after the first. Each correct item counts one point. Maximum score, 12 points.

Note carefully if the proper symbols have been placed under the drawings in the first two rows. If so, all succeeding symbols may be counted as correct without inspection;¹ if not, succeeding rows must be inspected and are credited only where found correct. Incomplete or only partially correct items count nothing.

Test 3. Each drawing properly completed counts one point. Maximum score, 12 points. No partial credits are given. Inaccuracy of drawing is not considered, only the evident intention. If the right answer is given to any item, together with something else that is reasonably lacking, count the item as correct — as, for example, in Form A, if pupils are drawn in the eyes in Item 1, or

¹ It has been found that when the first two rows are correct, it almost never happens that errors are made thereafter. If it should be noted incidentally that there are errors in succeeding rows, credit should be deducted accordingly.

the handle of the pistol is shaded. However, if too much is drawn in, the item counts as wrong — as, for example, in Form A, if other circles in Item 8 besides the central one are completed, or if more than one square in the checkerboard is blacked.

Test 4. Each square through which the line is successfully drawn counts one point, — that is, without crossing a line or entering a wrong passage, — provided, however, that slight cutting of corners, etc., apparently only through awkwardness, do not count off.

Test 5. Each line of drawings correctly answered counts one point. Maximum score, 7 points. Count off one point from the score if the figures are not placed in the small squares as directed.

Test 6. Each line of drawings correctly answered counts one point. Maximum score, 8 points. If two or more answers are given to any item, count that item wrong.

Tests 7 and 8. Each item counts one point. Maximum score in each test, 10 points. If more than one answer is given to any item, count that item wrong.

In scoring Tests 6, 7, and 8, the scorer should note the regular appearance of the correct answers. This may be committed to memory in a few moments, after which no reference is needed to the Table of Answers.

DIRECTIONS FOR SCORING ADVANCED EXAMINATION

GENERAL PLAN

The general plan of scoring is as follows. First, the Score in each test is obtained. In all cases except that of Test 3 (see below) the Score will consist of the number of right responses. The Test Scores are then added to find the Total Score, the measure of the pupil's Intelligence.

For convenience in scoring there is provided an Examiner's Key, a booklet of transparent paper on each page of which are indicated the answers to one of the ten tests of Forms A and B. The

method of using the key is as follows: Place the appropriate page of the key over the page of the examination booklet to be scored. Adjust so that the columns of answers are opposite one another, or, for pages of underlining, so that certain given words are superposed. Each correct underlining will then be crossed by a black dot. All underlinings not so crossed by black dots are incorrect. The correctness or incorrectness of the underlinings may thus be seen at a glance.

Some examiners find it convenient to separate the pages of the key and paste those containing the answers to Tests 1, 4, 5, and 6 on cardboard for convenience in handling and to render them opaque. The pages may then be kept together in an envelope.

It is suggested for the scoring of all tests except Test 3 that there be placed either a check mark (✓) opposite each correct answer, or a cross (×) opposite each incorrect or omitted answer, or both check marks and crosses, and a line drawn under the number of the last problem answered. Then by adding the number of checks or subtracting the number of crosses from the number of the last problem answered, the Score may be found.

SPECIAL DIRECTIONS

In Test 1 there should be subtracted from the score one point for each —1 appearing in a circle in the margin of the page. (See footnote under directions for Test 1.)

In the case of each test, except the Disarranged Sentence Test (Test 3), one credit is to be given for each correct answer, and no credit for wrong or omitted answers. In the case of the Disarranged Sentences, however, since there are but two alternate answers, *true* and *false*, theoretically, of the answers given concerning the sentences not properly solved by any pupil, but guessed at, one half may be right by chance. Therefore if, say, 15 of the 25 sentences were properly solved and correctly answered, and 6 of the remaining 10 guessed at, leaving 4 blank, of the 6 guessed at 3 might be

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right by chance. This would make 18 right, 3 wrong, and 4 blank. This suggests that as many credits should be deducted from the 18 as were wrong (3), thus giving a score of "right minus wrong," or $18 - 3 = 15$, the proper score. A person guessing at 24 of them, and getting 12 right by chance, would then attain a score of $12 - 12 = 0$.¹

In scoring Test 3 a check should be placed after each correct answer, a cross after each incorrect answer *only*, and (if desired) an O after each omitted answer (blank). The score is then the number of "right-minus-wrong," that is, the number of checks minus the number of crosses. If in any case the score thus obtained comes out negative, call it 0.

If in any test two or more answers are underlined in such a way as to be equivocal, the item counts as if omitted. (Counts neither right nor wrong in Test 3.) It may often happen that an examinee has failed to follow the directions given for indicating answers. Such failure may consist in checking answers instead of underlining, crossing off wrong answers instead of underlining right ones, not placing answers in the proper parentheses, writing answers when they should be underlined, failure to underline the words in Test 9, carelessly underlining two or more alternative answers without crossing off those not intended, etc. In general, the following principle is to guide in scoring such tests: *Ascertain if possible the intent of the examinee and score accordingly, but deduct one point from the score that would otherwise be obtained in the test.* In scoring a test in which the directions have thus been ignored, place -1 enclosed in a circle on the margin of the page, to indicate that 1 point is to be deducted from the score in the test.

¹ It may be shown, however, that identical scores will be obtained if, instead of scoring in the above manner, this test be scored by giving 2 credits for each right answer, no credit for each wrong answer, and 1 credit for each blank, then subtracting from the number thus obtained a number equal to the total number of items in the test (being in this case, 25). Thus the above score

RECORDING SCORES

Two alternative methods of recording scores are provided. One method is as follows: When the booklets of a group have been scored, the scores may be copied from the inner pages on to the front page in the spaces provided, the adding done here, and the Total Score written below them. Later, as the Index of Brightness and the Percentile Rank are found, these may be entered in the spaces provided and the booklets filed as records of each individual's performance in the examination. (If an adding machine is available, this may be used to add the ten scores, and only the Total Score need be written on the front page.)

A second method is to copy the scores in the ten tests, together with other data for each pupil, on to the Record Sheet which is provided for this purpose. The ruling on the Record Sheet is spaced to accommodate the records of 25 individuals when double spacing is used on a typewriter. It is suggested that when a group exceeds 25 persons in number, single spacing be used, which will allow records of 50 individuals to be placed on a single sheet. If scores are copied by hand, it may be found more convenient, for vertical adding, to turn the sheet on its side when entering scores. Similarly, with this method, if an adding machine is used, the ten Test Scores need not be copied — merely the Total Score.

The chief purpose of the Record Sheet is to bring to a single sheet the records of from 25 to 50 booklets for ready reference by the school principal or business manager. It is also easier to copy scores from a booklet to a separate sheet. For convenience of reference to the Record Sheet the booklets should be arranged in the alphabetical order of the names of individuals of the group before transferring the records to the Record Sheet.

would be obtained as follows (18 right, blank, 3 wrong, total 25):
 $18 \times 2 = 36$. $36 + 4 = 40$. $40 - 25 = 15$, the proper score as before.
Either method, therefore, may be used. The former is more convenient when the number of blanks is large; the latter, when the number of blanks is small.

The records of these tests may be exceedingly valuable after years have elapsed, especially in cases of reëxamination, and should be carefully preserved.¹

INTERPRETATION OF RESULTS

INTELLIGENCE AND BRIGHTNESS

There are two aspects of the mental ability of a child which must not be confused. One is his degree of Intelligence and the other his degree of Brightness. Intelligence in this connection refers to the child's degree of mental development or mental maturity — how far the growth of his mental ability has progressed. Brightness, however, refers to a special consideration of the relation of his Intelligence to that of others of his own age. Intelligence is measured by the pupil's score in the scale.² Brightness is measured in different terms, as will be explained below.

The hypothetical exactly normal or "average" individual progresses in mental growth at a certain rate, such that at each year of age he attains a score just equal to the norm for that age, as shown in the Table of Norms. That is, if tested at the age of 8 years, his score in the Advanced Examination is 40 points, at 9 years 52 points, etc.³ His progress in terms of score is uniform until the age of 14 years, when the yearly increments of growth in terms of score decrease until the age of 18 years, beyond which

¹ The author of the scale requests that distributions of scores be sent him to aid in the establishment of comprehensive norms. For this purpose a sheet called Examiner's Report to Author is enclosed in each package of booklets. Directions for entering scores are given on the report sheet. The receipt of these data will be appreciated. Address Dr. Arthur S. Otis, care of World Book Company, Yonkers-on-Hudson, New York.

² In the Binet Scale, Intelligence is measured in terms of Mental Age.

³ It should be noted by those who have used the earlier edition of the Manual and a Table of Norms supplied separately that the present Table of Norms is a revision.

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apparently no further growth takes place. At 18 years of age an individual is as intelligent as he will ever be.¹

If we take 1000 ten-year-olds at random, however, from the school population of the country, we find their scores, in the Advanced Examination, ranging all the way from almost zero to nearly 150, with a median score of 64 and a middle half of scores extending from 44 to 84. Similarly, if we take 1000 fourteen-year-olds at random, we find their scores ranging from less than 20 to over 190, with a median at 112 and a middle half between 92 and 132. We find, in fact, that at each age the distribution of scores follows very closely the so-called law of normal distribution, with a middle half of the scores having a range of approximately 40 points — from 20 points below the norm to 20 points above the norm. (See Table of Distributions of Scores, pages 70-72.) We find that for each age approximately 10 per cent of scores are 40 points or more above the norm, and approximately 10 per cent of scores are 40 points or more below the norm.²

¹ The increase of knowledge, experience, and judgment which is acquired after the age of 18 must not be confused with Intelligence.

² To be strictly accurate, we should state that in no two cases are the measures of variability of the distributions of scores for the different age groups exactly the same. It has been found with the use of the Binet Scale that the distributions of Mental Ages of lower age groups are appreciably narrower than the distributions of Mental Ages of the upper age groups. The measure of Brightness used, therefore, is the Intelligence Quotient, obtained by dividing the Mental Age by the Chronological Age on the assumption that this was for practical purposes a simple method which most nearly approximated the actual conditions. However, with the accumulation and careful study of increasing numbers of scores of the Otis Group Intelligence Scale, of which over 10,000 have now been brought together, it becomes increasingly evident that for a group scale of this type it is more nearly accurate for practical purposes to assume that the distributions of scores at the various age levels are of the same degree of variability. This calls for a new method of measuring Brightness, which we have finally adopted.

The determination of the true measures of variability of the distributions of scores at the various age levels is vitiated by several conditions. The chil-

CHILDREN

This wide range of scores of a group of pupils of the same age is due to the fact that certain children have an innate capacity for greater mental achievement than others, which operates to give them, chiefly during the early years of their mental development, an advance over their less fortunate fellows. This innate capacity we have called *Brightness*. That is, the greater the capacity for mental development, or the greater the potential development, the greater the degree of *Brightness*. A child who exceeds just one half of the children of his age in Intelligence and whose score is therefore just equal to the norm for that age is considered just Normal. If a pupil obtains a score which is 25 points above the norm for his age, we may say that he has an *Increment of Score* of 25 points, and if his score falls short of the norm by 15 points we may say that he has a *Decrement of Score* of 15 points. Either the Increment of Score or the Decrement of Score is a *Deviation from the Norm*. Those who exceed more than half of the children of their own age and who consequently have an Increment of Score are therefore Brighter than Normal, and those who exceed less than half and have a Decrement of Score are Duller than Normal. Broadly speaking, however, the term "normal" is used to characterize all those who fall within the middle half of the group as distributed on the scale of *Brightness*. Usually only those who fall in the upper quarter are termed Bright and only those who fall in the lower quarter are termed Dull.

dren of ages eight and nine who are tested are necessarily selected for high intelligence, since those of lower intelligence are in grades below where the scale has been applied. Again, the distributions of the scores of the upper age levels are vitiated by the fact that many pupils of inferior mental ability drop out of school at various intervals. The exact degree to which this selection affects the distributions is only to be conjectured. It will be noted that the norms for the ages of sixteen years and over are such that *more* than 50 per cent of school pupils obtain scores above the norms for their ages. This will be understood in the light of the fact of the selection of bright pupils in the upper age groups due to dropping out of pupils of inferior ability.

INDEX OF BRIGHTNESS

It may be seen, therefore, that an individual's Deviation from the Norm is a measure of his degree of Brightness. However, since this measure would involve the use of plus and minus signs, another and more convenient measure of Brightness is suggested which is called the *Index of Brightness* (IB). Thus, let an Index of Brightness of 100 represent exact Normality. Then, if an individual has an Increment of Score of 25 points, we may add 25 to 100 and say he has an Index of Brightness of 125. Similarly, if an individual has a Decrement of Score of 15 points, we may subtract the 15 from 100 and say he has an Index of Brightness of 85. The Index of Brightness of an individual of any age is found, therefore, by adding to 100 the number of points by which his score exceeds the norm for his age, or by subtracting from 100 the number of points by which his score falls below the norm for his age.¹ Since the norm for an adult—any individual of 18 years or over—is 130 points, an adult's Index of Brightness is obtained by adding to or subtracting from 100 the number of points by which his score exceeds or falls below 130 points. An adult making a score of 170, for example, would have an IB of 140.

PERCENTILE RANK

A pupil who exceeds just 50 per cent of the children of his age in Intelligence is said to have a *Percentile Rank* (PR) of 50. One who exceeds just 75 per cent of the children of his age in Intelligence is said to have a Percentile Rank of 75, etc. It may be seen, therefore, that the range of Percentile Ranks is from 0 to 100. A PR of 50 means exact Normality, etc.

Now it is accepted as a fundamental fact that in most cases a child who is above Normal at one age will be above Normal at all ages, and a child who is below Normal will always be below Normal. Moreover, the degree of Brightness of an individual is expected to

¹It is possible for an IB to be negative. This does not affect its usefulness.

remain approximately constant. Were this not so, prognostication would be impossible. Intelligence measurement would be of little value.¹

This means that if a ten-year child exceeds just 50 per cent of ten-year-olds in Intelligence, — being therefore a Normal child, — he will be expected to exceed approximately 50 per cent of children of his age at any later time and hence, when an adult, to exceed 50 per cent of adults in Intelligence. That is, he maintains a constant Percentile Rank of 50. Similarly, a ten-year child who exceeds 75 per cent of ten-year-olds in Intelligence will be expected to exceed 75 per cent of children of his age at any later time and hence ultimately to exceed in Intelligence 75 per cent of adults, etc. That is, an individual's Percentile Rank is assumed to remain approximately constant. The Percentile Rank of an individual, therefore, is another measure of his degree of Brightness.

It is impossible for any examiner to find an approximately correct Percentile Rank for any pupil from his own data unless it is very extensive, because the exact effect of selection in any single school is unknown. From 11,000 scores, however, have been deduced the theoretical values of Percentile Rank corresponding to each Index of Brightness. These are given in Table 11.

MENTAL AGE AND INTELLIGENCE QUOTIENT

If it is desired to express the score of a pupil in terms of a Mental Age, after the manner of the Binet Scale, this may be done as follows. Find in the Table of Norms the score obtained by the pupil. Note the age for which this score is the norm.² That age is the Mental Age of the pupil. Since the norms do not extend above 130 points, no score of over 130 points can be expressed as a true Mental Age. The Mental Ages assigned as scores in the upper ranges of the Binet Scale are fictitious and are not intended to

¹ Exceptions to this rule are noted in certain special instances, particularly in the case of feeble-minded persons.

² Where the norm for two or more ages is the same, take the lesser age.

represent the normal degrees of Intelligence for those ages. They are used merely for the sake of consistency. The correspondence between scores and the fictitious Mental Ages used in the upper ranges of the Binet Scale is presumably such that 12 points equals one year of Mental Age throughout the scale. To assign a Mental Age corresponding to a Binet Mental Age to scores above 100, therefore, add to 13 years an amount equal to one month for each point of score above 100 points. Thus 112 points = 14 years, 124 points = 15 years, 136 points = 16 years, etc. In other words, the number of months in the Binet Mental Age of an individual is found by adding 56 to his score in the Advanced Examination. The exact nature of the correspondence in the extreme ranges is not known.

It is possible, of course, to find an Intelligence Quotient after the manner of the Binet Scale, for any individual whose score is expressed as a Mental Age, but this method of expressing degrees of Brightness is not recommended for use with the Otis Group Intelligence Scale. At the age of 13 years the following relation holds: IQ minus 100 = $\frac{2}{3}$ the Deviation from the Norm. Thus an Index of Brightness of 125 corresponds to an IQ of 110. Below 13 years the fraction decreases.

DISTRIBUTION OF SCORES

The scores of over 11,000 pupils from 79 cities have been assembled into a table given at the back of the Manual. The first row of numbers shows that of the 4th-grade pupils of ages 8 to 8-11, 2 received scores between 0 and 9, 13 received scores between 10 and 19, 45 between 20 and 29, etc. This table served as the basis for the January 1920 revision of the Table of Norms. The numbers of pupils in Grades 4 to 12 were as given in Table 1, showing Median and Quartile Scores, except that scores of 204 pupils of over 19 years were not included. It will be seen that the divergence between numbers of pupils in succeeding grades is not great, thereby insuring a fair selection from each grade represented.

TABLE 1
SHOWING THE MEDIAN AND QUARTILE SCORES OF THE VARIOUS
GRADES — 79 CITIES

GRADE	NUMBER OF PUPILS IN GRADE	SCORE EXCEEDED BY		
		75% PUPILS	50% PUPILS	25% PUPILS
4	1,318	12	47	82
5	1,212	32	67	102
6	1,343	51	84	117
7	1,417	67	100	133
8	1,603	81	114	147
9	1,499	94	124	154
10	1,210	104	134	162
11	1,049	111	144	168
12	1,101	120	153	170
Total	11,752			

It may be desirable to compare a pupil, or group of pupils constituting a grade, with the median intelligence of pupils of the various grades throughout the country. For this purpose the above table is given, showing the median scores and those scores exceeded by 75 per cent and 25 per cent of pupils in each of the various grades. The table is based on 11,752 cases, including the 11,548 cases whose scores are given in the Table of Distributions and 204 cases 19 years of age and over. Irregularities have been "smoothed."

Of 1017 scores of normal school students (eight normal schools), the following percentages attained the following scores :

TABLE 2
SCORES ATTAINED BY VARIOUS PERCENTAGES OF NORMAL SCHOOL STUDENTS

Highest score	217 points
Highest 10% exceeded	188 points
Highest 25% exceeded	175 points
Highest 50% exceeded	162 points
Highest 75% exceeded	145 points
Highest 90% exceeded	131 points
Lowest score	85 points

As has been pointed out, high school pupils constitute a selected group; that is, as a class they are above normal in Brightness. In order to provide means of comparing a high school pupil with other high school pupils, a table is given showing the median scores of pupils of the several ages in the high school only. For this purpose there were taken the scores of the ninth, tenth, eleventh, and twelfth grades only of those shown in the Table of Distributions of Scores. The number of pupils in each age group and the median scores of each age group (when "smoothed") were as shown in Table 3:

TABLE 3
SHOWING MEDIAN SCORES OF HIGH SCHOOL AGE GROUPS

AGE GROUP	NUMBER OF PUPILS IN AGE GROUP	MEDIAN SCORE OF AGE GROUP
12 to 12-II	65	128
13 to 13-II	430	130
14 to 14-II	898	132
15 to 15-II	1009	134
16 to 16-II	1104	136
17 to 17-II	746	138
18 to 18-II	289	140
19 to 19-II	178	140
20 and over	36	138

From this table it may be seen that taking high school pupils separately, the younger pupils as a class are almost as mature mentally as the older ones. This is to be explained partly, of course, by the fact that the growth of intelligence becomes slower and slower during the high school ages, so that not so much growth is expected in the four years, say, between the ages of 13 and 17 as between the ages of 9 and 13. The chief explanation, however, is that the younger high school pupils as a class are considerably above "average" in Brightness, being highly "selected," since the duller pupils of their ages have not yet reached the high school or never will reach it, while on the other hand the older pupils comprise those who arrived in high school at later ages and are therefore naturally less bright.

In order to obtain an estimate of the degree of Brightness of a pupil in comparison with individuals of his age in general, it is necessary, of course, to compare his score with the norm for his age as given in the Table of Norms.

RECAPITULATION

Intelligence refers to the amount of an individual's mental ability, regardless of age. Intelligence is measured in terms of the individual's score in the scale.

Norms. The norm or Normal Score corresponding to any given age is the median score of all individuals of that age. An individual attaining at any age a score just equal to the norm for that age is considered as just Normal. To find the norm for any age, consult the Table of Norms, find the score under the number of years of the age and opposite the number of additional months of the age. That score is the norm for that age.

Brightness refers to the relation between an individual's Intelligence and that degree of Intelligence which is Normal for one of his age. Brightness may be measured in terms of Increment or Decrement of Score, in terms of Index of Brightness, or of Percentile Rank.

Increment of Score is the number of points by which the score of any individual exceeds the norm for his age. **Decrement of Score** is the number of points by which the score of any individual falls short of the norm for his age.

The **Index of Brightness** is the most convenient measure of Brightness. The IB representing exact Normality is 100. The IB of any individual is found by adding to 100 his Increment of Score or by subtracting from 100 his Decrement of Score.

The **Percentile Rank** of an individual is the percentage of individuals of his age whom he exceeds in Intelligence. It is the percentage of persons in general whom he exceeds in Brightness. Percentile Ranks extend from 0 to 100, with a Normal Percentile Rank of 50. The relation between Percentile Ranks and Indices of Brightness is shown in Table 11. The table does not take

account of the slight irregularities of the actual distributions of scores of the various age groups, but gives the theoretical expected Percentile Rank corresponding to each Index of Brightness.

The **Mental Age** corresponding to any score is the age for which that score is the norm. Scores not over 130 points may be expressed as true Mental Ages by reference to the Table of Norms. Scores of over 100 points may be expressed as fictitious Mental Ages by adding to 13 years one month for each point by which the score exceeds 100 points.

Table of Distributions of Scores. It should be realized that a measure of Brightness such as the Index of Brightness, Percentile Rank, or Intelligence Quotient is merely a convenient method of reducing the measure to a single figure for comparative purposes. To appreciate best the significance of any individual score, it should be viewed in the light of the Table of Distributions of Scores. This shows the relation between the pupil's score and the actual scores of others of his own age and grade.¹

TABLE 4
ANSWERS, PRIMARY EXAMINATION (*Forms A and B*)

TEST	5	6	7	8
Item				
1.	2-1-3	3	O	2
2.	2-3-1	2	S	2
3.	1-3-2	1	S	3
4.	2-1-4-3	2	O	3
5.	3-1-2-4	3	O	2
6.	3-1-5-4-2	4	S	2
7.	1-3-5-2-4	5	S	1
8.		4	O	1
9.		3	O	2
10.			S	2

¹TO STUDENTS OF MENTAL MEASUREMENT: The author will be pleased to communicate with any student who is considering the use of the Otis Group Intelligence Scale for research purposes and will gladly propose various studies which will serve as subjects for these.

PLATE 1

ANSWERS, PRIMARY EXAMINATION, TEST 1 (Form A)

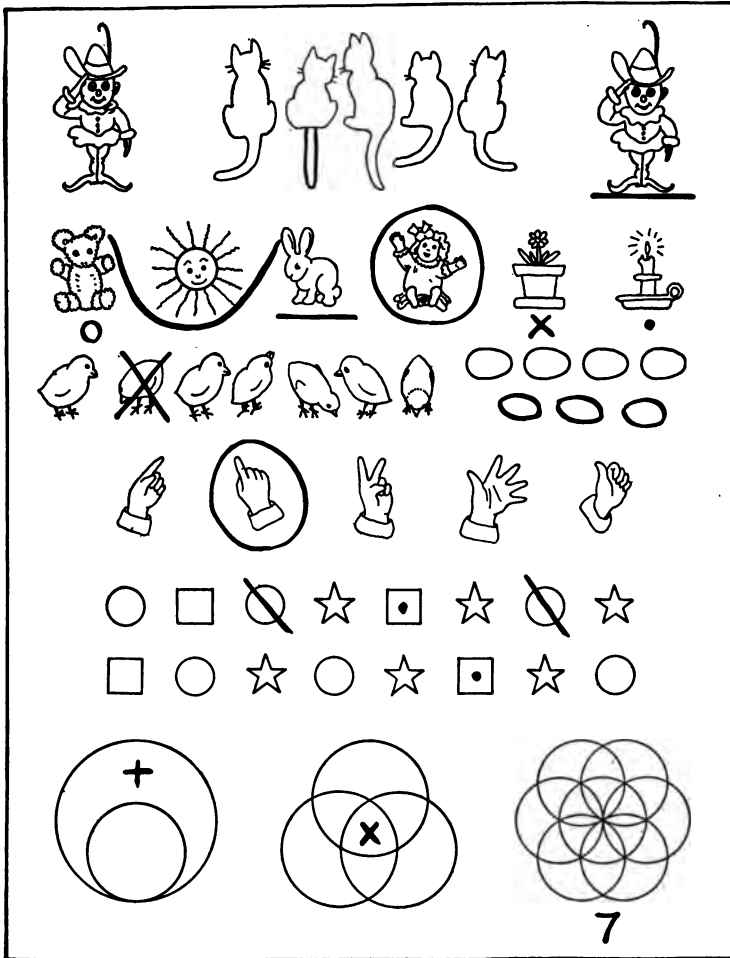


PLATE 2

ANSWERS, PRIMARY EXAMINATION, TEST 3 (Form A)

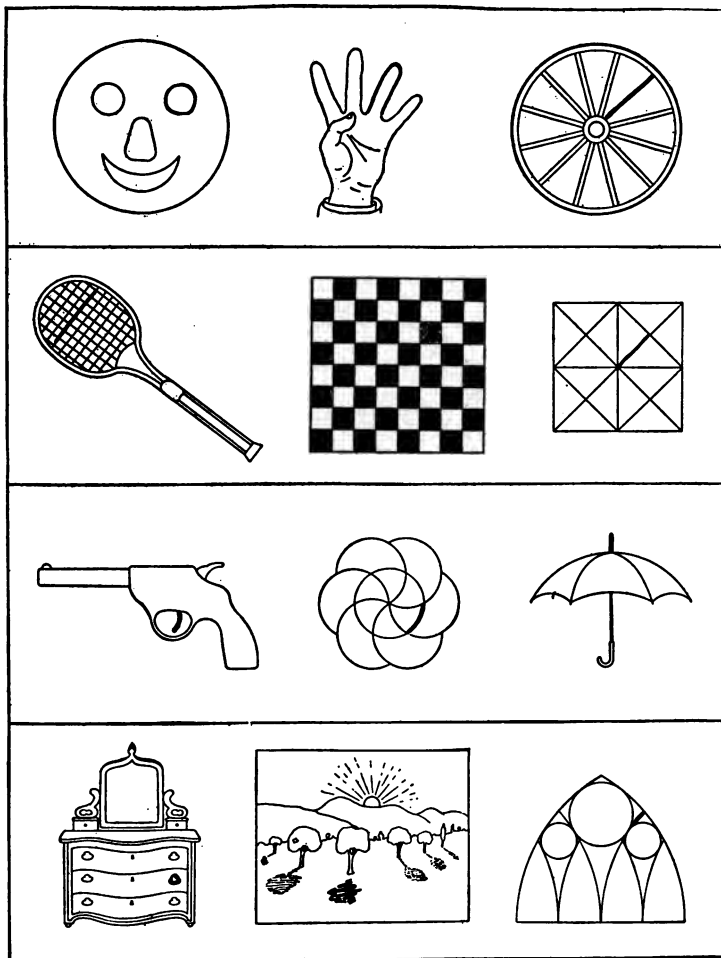


PLATE 3

ANSWERS, PRIMARY EXAMINATION, TEST 1 (Form B)

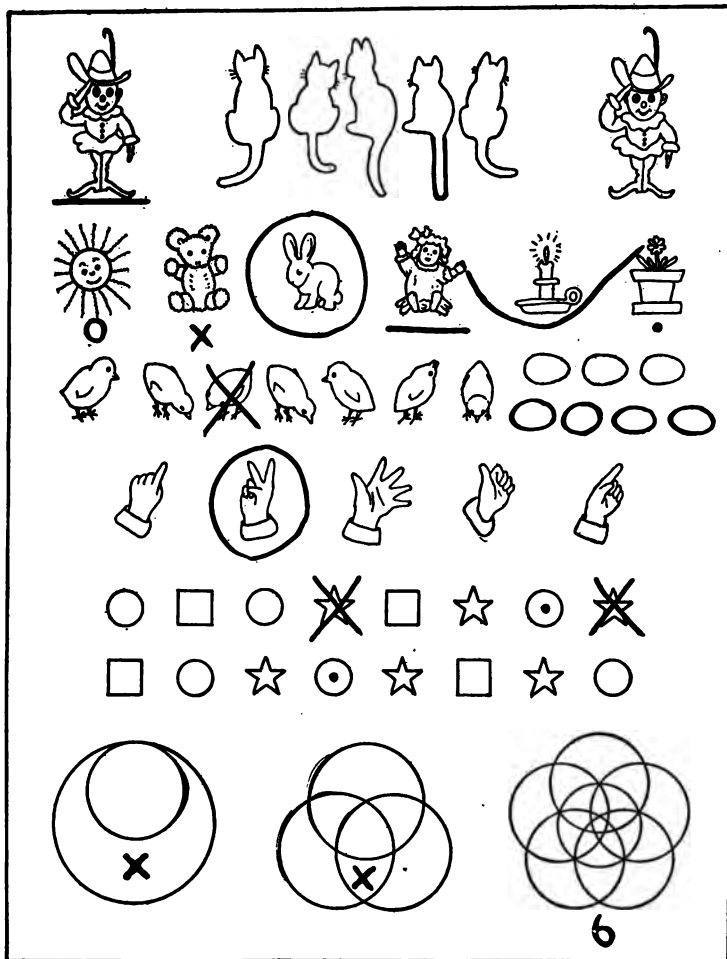
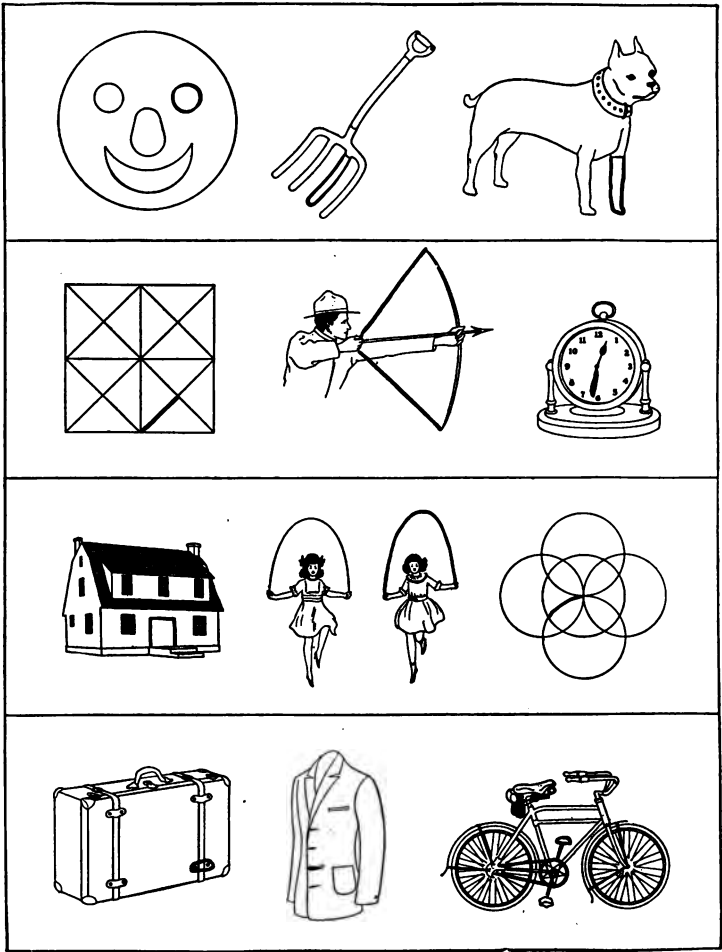


PLATE 4

ANSWERS, PRIMARY EXAMINATION, TEST 3 (Form B)



ANSWERS, ADVANCED EXAMINATION (Form A)[illegible]

TABLE 6

ANSWERS, ADVANCED EXAMINATION (Form B)[illegible]

TABLE 7
NORMS FOR ADVANCED EXAMINATION

YEAR	8	9	10	11	12	13	14	15	16	17	18
Month											
0	40	52	64	76	88	100	112	121	125	128	130
1	41	53	65	77	89	101	113	121	126	128	130
2	42	54	66	78	90	102	114	122	126	128	130
3	43	55	67	79	91	103	115	122	126	128	130
4	44	56	68	80	92	104	116	123	126	129	130
5	45	57	69	81	93	105	117	123	127	129	130
6	46	58	70	82	94	106	117	124	127	129	130
7	47	59	71	83	95	107	118	124	127	129	130
8	48	60	72	84	96	108	119	124	127	129	130
9	49	61	73	85	97	109	119	125	127	129	130
10	50	62	74	86	98	110	120	125	128	129	130
11	51	63	75	87	99	111	120	125	128	129	etc.

Norms for the Primary Examination have not yet been established. A tentative table is being prepared, which may be had upon application to the publishers. Sufficient data on which to base a revision of this tentative table will be ready in the autumn of 1920, when a further revision will be prepared for distribution. Early in 1921 a final table of norms, based on the results of testing at least 10,000 children, will be ready and will be included in this Manual.

TABLE 8
SHOWING THE CORRESPONDENCE BETWEEN 9-TEST¹ SCORES AND
10-TEST SCORES

9	10	9	10	9	10	9	10	9	10	9	10
1	10	31	43	61	75	91	108	121	140	151	172
2	11	32	44	62	76	92	109	122	141	152	173
3	12	33	45	63	77	93	110	123	142	153	174
4	13	34	46	64	78	94	111	124	143	154	175
5	14	35	47	65	80	95	112	125	144	155	176
6	15	36	48	66	81	96	113	126	145	156	177
7	17	37	50	67	82	97	114	127	146	157	178
8	18	38	51	68	83	98	115	128	147	158	180
9	19	39	52	69	84	99	116	129	148	159	181
10	20	40	53	70	85	100	117	130	149	160	182
11	21	41	54	71	86	101	118	131	151	161	183
12	22	42	55	72	87	102	119	132	152	162	184
13	23	43	56	73	88	103	120	133	153	163	185
14	24	44	57	74	89	104	122	134	154	164	186
15	25	45	58	75	90	105	123	135	155	165	187
16	26	46	59	76	91	106	124	136	156	166	188
17	27	47	60	77	92	107	125	137	157	167	189
18	29	48	61	78	94	108	126	138	158	168	190
19	30	49	62	79	95	109	127	139	159	169	191
20	31	50	63	80	96	110	128	140	160	170	192
21	32	51	65	81	97	111	129	141	161	171	194
22	33	52	66	82	98	112	130	142	162	172	195
23	34	53	67	83	99	113	131	143	163	173	196
24	35	54	68	84	100	114	132	144	164	174	197
25	36	55	69	85	101	115	133	145	166	175	198
26	37	56	70	86	102	116	134	146	167	176	199
27	39	57	71	87	103	117	135	147	168	177	200
28	40	58	72	88	104	118	137	148	169	178	201
29	41	59	73	89	105	119	138	149	170	179	202
30	42	60	74	90	106	120	139	150	171	180	203

¹ Omitting Test 10.

TABLE 9
SHOWING THE CORRESPONDENCE BETWEEN 8-TEST¹ SCORES AND
10-TEST SCORES

8	10	8	10	8	10	8	10	8	10	8	10
1	10	31	48	61	85	91	120	121	155	151	190
2	11	32	50	62	87	92	122	122	157	152	191
3	13	33	51	63	88	93	123	123	158	153	192
4	14	34	52	64	89	94	124	124	159	154	193
5	15	35	53	65	90	95	125	125	160	155	194
6	17	36	55	66	91	96	126	126	161	156	195
7	18	37	56	67	93	97	127	127	162	157	197
8	19	38	57	68	94	98	129	128	163	158	198
9	21	39	59	69	95	99	130	129	165	159	199
10	22	40	60	70	96	100	131	130	166	160	200
11	23	41	61	71	97	101	132	131	167	161	201
12	25	42	62	72	98	102	133	132	168	162	202
13	26	43	64	73	100	103	134	133	169	163	203
14	27	44	65	74	101	104	136	134	170	164	205
15	29	45	66	75	102	105	137	135	171	165	206
16	30	46	67	76	103	106	138	136	173	166	207
17	31	47	68	77	104	107	139	137	174	167	208
18	32	48	70	78	105	108	140	138	175	168	209
19	34	49	71	79	107	109	141	139	176	169	210
20	35	50	72	80	108	110	143	140	177	170	211
21	36	51	73	81	109	111	144	141	178	171	213
22	37	52	75	82	110	112	145	142	179	172	214
23	39	53	76	83	111	113	146	143	181	173	215
24	40	54	77	84	112	114	147	144	182	174	216
25	41	55	78	85	114	115	148	145	183	175	217
26	42	56	79	86	115	116	150	146	184	176	218
27	44	57	80	87	116	117	151	147	185	177	219
28	45	58	82	88	117	118	152	148	186	178	220
29	46	59	83	89	118	119	153	149	187	179	221
30	47	60	84	90	119	120	154	150	189	180	222

¹ Omitting Tests 1 and 10.

TABLE 10
SHOWING THE CORRESPONDENCE BETWEEN 7-TEST¹ SCORES
AND 10-TEST SCORES

7	10	7	10	7	10	7	10	7	10
1	10	31	55	61	93	91	131	121	169
2	11	32	57	62	94	92	132	122	170
3	13	33	58	63	96	93	134	123	171
4	14	34	59	64	97	94	135	124	173
5	16	35	60	65	98	95	136	125	174
6	17	36	62	66	100	96	137	126	175
7	19	37	63	67	101	97	139	127	176
8	20	38	64	68	102	98	140	128	178
9	22	39	66	69	103	99	141	129	179
10	23	40	67	70	105	100	142	130	180
11	25	41	68	71	106	101	144	131	181
12	26	42	69	72	107	102	145	132	183
13	28	43	71	73	108	103	146	133	184
14	30	44	72	74	110	104	147	134	185
15	31	45	73	75	111	105	149	135	186
16	33	46	74	76	112	106	150	136	188
17	34	47	76	77	113	107	151	137	189
18	36	48	77	78	115	108	152	138	190
19	37	49	78	79	116	109	154	139	191
20	39	50	79	80	117	110	155	140	193
21	40	51	81	81	118	111	156	141	194
22	42	52	82	82	120	112	157	142	195
23	43	53	83	83	121	113	159	143	196
24	45	54	84	84	122	114	160	144	198
25	46	55	86	85	123	115	161	145	199
26	48	56	87	86	125	116	162	146	200
27	50	57	88	87	126	117	164	147	201
28	51	58	89	88	127	118	165	148	203
29	53	59	91	89	128	119	166	149	204
30	54	60	92	90	130	120	168	150	205

¹ Omitting Tests 1, 6, and 10.

TABLE 11
SHOWING THE CORRESPONDENCE BETWEEN PERCENTILE RANKS AND INDICES
OF BRIGHTNESS
(Advanced Examination)

IB	PR	IB	PR	IB	PR	IB	PR	IB	PR	IB	PR
0	0.04	30	0.9	60	8.9	90	37	120	75	150	95.4
1	0.045	31	1.0	61	9.4	91	38	121	76	151	95.7
2	0.05	32	1.1	62	10.0	92	39	122	77	152	96.0
3	0.055	33	1.2	63	10.6	93	41	123	78	153	96.3
4	0.06	34	1.3	64	11.2	94	42	124	79	154	96.6
5	0.07	35	1.4	65	11.9	95	43	125	80	155	96.8
6	0.08	36	1.6	66	12.6	96	45	126	81	156	97.1
7	0.09	37	1.7	67	13.3	97	46	127	82	157	97.3
8	0.10	38	1.8	68	14.0	98	47	128	82.8	158	97.5
9	0.11	39	2.0	69	14.8	99	49	129	83.6	159	97.7
10	0.12	40	2.2	70	15.6	100	50	130	84.4	160	97.9
11	0.13	41	2.3	71	16.4	101	51	131	85.2	161	98.0
12	0.15	42	2.5	72	17.2	102	53	132	86.0	162	98.2
13	0.17	43	2.7	73	18.0	103	54	133	86.7	163	98.3
14	0.19	44	2.9	74	19	104	55	134	87.4	164	98.5
15	0.21	45	3.2	75	20	105	57	135	88.1	165	98.6
16	0.23	46	3.4	76	21	106	58	136	88.8	166	98.7
17	0.26	47	3.7	77	22	107	59	137	89.4	167	98.8
18	0.29	48	4.0	78	23	108	61	138	90.0	168	98.9
19	0.32	49	4.3	79	24	109	62	139	90.6	169	99.0
20	0.35	50	4.6	80	25	110	63	140	91.1	170	99.1
21	0.39	51	4.9	81	26	111	64	141	91.7	171	99.17
22	0.43	52	5.3	82	27	112	66	142	92.2	172	99.24
23	0.47	53	5.6	83	28	113	67	143	92.7	173	99.31
24	0.52	54	6.0	84	29	114	68	144	93.1	174	99.37
25	0.57	55	6.5	85	31	115	69	145	93.5	175	99.43
26	0.63	56	6.9	86	32	116	71	146	94.0	176	99.48
27	0.69	57	7.3	87	33	117	72	147	94.4	177	99.53
28	0.76	58	7.8	88	34	118	73	148	94.7	178	99.57
29	0.83	59	8.3	89	36	119	74	149	95.1	179	99.61
30	0.91	60	8.9	90	37	120	75	150	95.4	180	99.65

TABLE 12
SHOWING THE DISTRIBUTIONS OF SCORES IN THE ADVANCED EXAMINATION FOR AGE GROUPS EIGHT TO EIGHTEEN
(11,548 Unselected Pupils from 79 Cities)

AGE	GRADE	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	TOTALS
8:0 to 8:11	4	2	13	45	60	48	32	29	31	20	6	1											286
	5	1	2	4	3	1	2	29	32	20	7	1											10
	Totals	3	15	49	63	49	34	29	32	20	7	1											302
9:0 to 9:11	4	1	25	75	64	81	82	83	76	55	14	10	4	8	2								570
	5		7	4	4	8	10	11	12	2	21	8	9	8									100
	6							1		2	1	3	1										8
	7									1													1
	Totals	1	20	79	68	89	92	95	88	60	36	21	14	8	2								679
10:0 to 10:11	4	2	28	39	60	61	47	19	21	10	5	3	1	12	3	1							296
	5	1	5	4	24	41	50	75	60	48	35	22	15	4	2	4							402
	6				2	8	6	9	24	22	12	15	4	2									108
	7									1	4	2	1										8
	Totals	3	33	43	84	104	111	100	90	82	63	41	33	17	5	5							814
11:0 to 11:11	4	1	7	10	21	32	31	6	1	30	14	27	18	9	3								109
	5	1	3	12	20	39	30	37	52	71	44	34	18	12	12								333
	6				2	4	21	48	36	90	47	35	31	23	20	3	3						424
	7				1	1		4	13	14	3	1	1	1	4	3	5	3			1		166
	8														1		1	1					16
	9																						5
	Totals	2	10	22	44	76	102	95	122	143	116	134	96	68	45	18	9	4	1				1,107
12:0 to 12:11	4	2	4	5	8	10	4	1	1	11	4	8	1	26	3	1							34
	5	2	10	9	39	38	30	37	31	69	48	62	36	3	10	4							220
	6		1	1	4	17	30	46	70	82	75	77	83	50	30	14	10	4	2				414
	7		1	3	3	1	14	30	42	8	15	24	34	24	27	20	9	10	1	1			521
	8						3	5	3	3	6	7	11	6	7	8	8	3	3				181
	9							1							1								63
	10																				1		2
	Totals	4	15	18	54	66	78	118	148	173	148	178	105	100	68	43	28	17	6	1			1,435

Interpretation of Results

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AGE	GRADE	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	TOTALS
		TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	TO	
		9	19	29	39	49	59	69	79	89	99	109	119	129	139	149	159	169	179	189	199	209	
13:0 to 13:11	4	3	1	6	9	14	20	14	6	2	1	2	8	2	1								18
	5		8	1	1	14	22	27	46	36	21	26											100
	6			1	1	1	13	28	53	67	73	71	50	20	11	11	3						205
	7						2	5	10	20	55	65	92	85	70	47	35	14	7	1	2		418
	8					1	1	5	5	15	18	32	50	51	72	51	38	22	3	2	1		529
14:0 to 14:11	9												4	8	10	16	15	9	1				366
	10																						63
	Totals	3	9	17	25	44	59	79	129	149	168	196	204	175	164	125	91	45	11	3	3		1,099
	4			1	2	1			1	10	1	6	1	2									4
	5		4	6	7	8	13	20	18	10	11	31	16	12	4	2	1	13	2				49
15:0 to 15:11	6		1	3	3	2	4	6	20	40	68	92	96	72	52	30	23	13	3	1			106
	7						13	17	31	42	66	89	89	89	89	64	36	31	12	1			215
	8						1	3	10	30	54	71	80	89	89	64	36	31	12	1			539
	9										8	17	30	29	42	60	48	26	17	5	1		580
	10												1	1	2	3	2	6	2	4	1		283
16:0 to 16:11	11																						20
	12																						15
	Totals		5	10	22	31	34	51	89	131	178	218	234	205	189	171	110	78	35	11	3		1,811
	4																						1
	5		2	4	1	1	2	1	3	10	11	10	5	2	1								13
17:0 to 17:11	6																						3
	7																						5
	8																						6
	9																						258
	10																						321
18:0 to 18:11	11																						49
	12																						180
	Totals		3	5	5	12	15	19	38	77	95	131	171	186	184	133	101	75	57	24	11	4	1,306

To avoid fine, this book should be returned on
or before the date last stamped below.

P499 Otis, A.S. 49089
088 Otis group intelligence
1920 scale

NAME	DATE DUE
<i>S. M. Main</i>	JUL 5 1921
<i>Twitchee</i>	OCT 1 0 1921